

#### Introducing Turbo Basic, the highspeed BASIC you'd expect from Borland!

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again. Turbo Basic is a complete development environment; it includes a lightning-fast compiler, an interactive editor, and a trace debug-

ging system. Because Turbo Basic is compatible with BASICA, chances are that you already know how to use Turbo Basic.

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In fact, building fast compilers is a Borland specialty; both our Turbo Pascal and our Turbo Prolog outperform all their rivals by factors, and with Turbo Basic, we're proud to introduce the first high-speed BASIC compiler for the IBM\*PC If BASIC taught you how to walk. Turbo Basic will teach you how to run!

The Critics' Choice 6 6 Borland has succeeded in stretching the language without weighing us down with unnecessary details . . . Turbo Basic is the answer to my wish for a simple yet blindingly fast recreational utility language . . . The one language you can't forget how to use, Turbo Basic is a computer language for the missus, the masters, the masses, and me.

#### Steve Gibson, InfoWorld

Borland's Turbo Basic has advantages over the Microsoft product. including support of the highspeed 8087 math chip.

John C. Dvorak 33

#### Turbo Basic ends the basic confusion

There's now one standard: Turbo Basic.

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Basic todayl

complete with source code! Yes, we've included MicroCalc our sample spreadsheet, complete with source code so that you can get started right away with a "real program" You can compile and run You can compile and run it "as is," or modify it

#### A technical look at Turbo Basic

- ✓ Full recursion supported Standard IEEE floating-point format
- Floating-point support, with full 8087 (math co-processor) integration. Software emulation if no 8087 present
- Program size limited only by available memory (no 64K limitation)
- EGA and CGA support Access to local, static, and global
- variables Full integration of the compiler, editor, and executable program,
- with separate windows for editing, messages, tracing, and execution Compile, run-time, and I/O errors place you in the source code
- where error occurred ✓ New long integer (32-bit) data
- type ✓ Full 80-bit precision
- ✓ Pull-down menus Full window management

System requirements IBM PC, XT, AT and true compatibles, PC-DOS IMS-DOS/ 20 or later One floppy drive, 2564



#### rurbo C: The fastest, most efficient and easyto-use C compiler at any price

Compilation speed is more than 7000 lines a minute, which makes anything less than Turbo C an exercise in slow motion. Expect what only Borland delivers: Quality, Speed, Power and Price.

#### Turbo C: The C compiler for amateurs and professionals

If you're just beginning and you've "kinda wanted to learn C," now's your chance to do it the easy way. Like Turbo Pascal, Turbo C's got everything to get you going.

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#### Turbo C: a complete interactive development



Like Turbo Pascal and Turbo Prolog. Turbo C comes

with an interactive editor that will show you syntax errors right in your source code Developing, debugging, and running a Turbo C program is a snap.

#### Turbo C: The C compiler everybody's been waiting for. Everybody but the competition

Borland's "Quality, Speed, Power and Price" commitment isn't idle corporate chatter. The \$99.95 price tag on Turbo C isn't a "typo," it's real. So if you'd like to learn C in a hurry, pick up the phone. If you're already using C, switch to Turbo C and see the difference for yourself.

System requirements BM PC, XT, AT and true compatibles. PC-DOS (MS-DOSI 2.0 or later One floppy drive 320K

#### Technical Specifications

M Compiler: One-pass compiler generating linkable object modules and inline assembler. Included is Sorland's high performance "Turbo Linker." The object module is compatible with the PC-DOS linker, Supports tiny, small, compact, medium, large, and huge memory model libraries. Can mix models with near and far pointers. Includes floating point emulator (utilizes 8087/80287 if installed)

- Interactive Editor: The system includes a powerful, interactive fullscreen text editor. If the compiler detects an error, the editor automatically positions the cursor appropriately in the source code. ☑ Development Environment: A
  - powerful "Make" is included so that managing Turbo C program development is highly efficient. Also includes pull-down menus and windows.
- Links with relocatable object modules created using Borland's Turbo Prolog into a single program. M ANSI C compatible
- included. environment versions included.

\*Introductory price-good through July 1, 1987

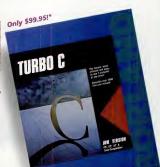
#### Sieve benchmark (25 iterations)

	Turbo C	Microsoft® C	Lattice C	
Compile time 3.89		16.37	1390	
Compile and link time	9.96	29.06		
Execution time	xution time 5.77		13.79	
Object code size	274	297	301	
Price	\$99.95	\$450.00	\$500.00	

Benchmark run on a 6 Mftr IBM AT using Turbo C version 1.0 and the Turbo Linker version 1.0, Microsoft C version 4.0 and the MS overlay linker version 3 St; Lattice C version 3 f and the MS object Antier version 3 OS

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Top: IBM's Enhanced Color Display, page 114. Above: the glare test helps determine quality, page 128



#### COVER STORY

Behind the Screens: EGA and Multiscan Monitors Phil Wiswell Vincent Puolin and Philip F.H. Rose/A year ago the decisions would have been easy, but today users looking to crown their PCs with an EGA or multiscan monitor face some difficult choices. Choosing such an important component of a computer system requires research and careful thought. Enter PC Labs to scrutinize eight top-of-the-line multiscan monitors and ten EGA displays ..... 107

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# VHAT'S INSIDE



Color monitors have come long way since the first CGA graced an IBM PC back in 1981. In the intervening years, EGA and PGC joined the standards list, creating an alphabet soup of graphics standards that made you wonder if you were buying a PC display or a postgraduate degree

So far, the choices have been pretty simple: if you wanted a better display, you moved up to EGA, or if you had specialized professional needs (and a bottomless budget), you could invest in a PGC setup. But all that changed about a year ago, when NEC Home Electronics released the NEC MultiSync, the first multiscan monitor (so called because it can shift between the frequencies, or scan rates, of various graphics standards). With its ability to switch between graphics modes, and with a resolution that not only supports anything currently on the market but has the capacity to handle standards that aren't even created vet, the MultiSync extended display technology into the future. All this, plus improved colors (and more of them) and a sharp, clear picture. In all, a landmark product.

Of course, it was only a matter of time before other display manufacturers caught the multiscan wave, and soon big-name companies like Sony and Quadram offered multiscan products, as did a bunch of others.

TIME FOR AN UPGRADE? But with a bigger selection comes a bigger problem-when should you upgrade to a multiscan monitor? Or should you upgrade at all? If you do, which model offers the best value? Conversely, if you stick to an EGA compatible, the choice is no easier-there are lots of EGAs brimming with features.

To help make this choice easier, we reviewed eight new multiscan monitors and ten EGAs, comparing them on the basis of resolution, color clarity, ease of setup, and price/performance ratio. We also tested the monitors for glare resistance (that's our glaretest apparatus pictured above with PC Labs project leader Philip F. H. Rose) and compatibility with popular software. Reviews and benchmark-test results begin on page 107.

This issue also marks the beginning of a new productivity column, Connectivity Clinic. Frank J. Derfler, Jr., a contributing editor of PC Magazine and author of our continuing series on connectivity, will offer readers his expertise in a question-and-answer column designed to help untangle the complicated world of networks, micro-to-mainframe communications, and other connectivity-related issues.

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# LETTERS TO **PC MAGAZINE**



#### CONNECTIVITY SERIES

The article "Making Connections: LANs Under NetWare" (PC Magazine, Volume 5 Number 21) was a most welcome and in-

formative review. Having just installed NetWare after many hours of studying the various options for server, vendor, and interface cards. I appreciate the effort



that your LAN team has put forth. The ability to actually try the complexities of an installed LAN adds just the kind of

value we expect from PC Magazine. Needless to say, few readers can perform these evaluations in the normal course, but like myself, they must depend upon spec sheets and user impressions as the next best alternative.

Although the performance degradation studies were particularly interesting, may I suggest that four terminals is just the starting point. It may be that tests of up to 20 terminals would be more appropriate for business-environment LANs

Also, it would be very useful to include AT-class terminals in the LAN tests since many networks are incorporating them. It is appealing to think an AT clone can be used in a LAN, but I would like to know if there are problems with hardware compatibility or clock speed. I am looking forward to the continuing work PC Magazine will be doing in this series and hope that you will consider some of my suggestions. Chet Flowd

Manhattan Beach, California

Frank J. Derfler, Jr., replies: Thank you for your useful comments on or more stations would in an office environment. According to our LAN team, in many of the tests the disk access light never goes out. You don't see that in typical LAN installations. When we have been able to gather more adapter cards and workstations together, our tests show you can extrapolate the results out along the same

five active workstations that are constantly

working the network harder than a dozen

In addition, our LAN test bed always includes one AT workstation running at 8 MHz. If there are incompatibilities, we tell you about them. By the way, the PC Labs LAN team is now benchmark-testing other connectivity alternatives, including PBX telephone systems.

The cover articles on LANs in the December 9 issue were excellent, and I look forward to future reviews. Also, I hope you plan on including a review of Alloy Computer Products' multiuser PC-Plus system and other similar systems in the future. Many thanks for an excellent magazine. Michael Gosling

West Linn, Oregon

In our ongoing series on connectivity, we will be covering all areas of interest, including multiuser systems. This series will not conclude until we have exhausted the topic, so keep your eyes open for the reviews that meet your needs in upcoming issues of PC Magazine.-Ed.

#### IT'S NOT A BUG

We appreciated your review of our textbased data management system, Instant Recall ("TBMS: Database Power Unleashed," PC Magazine, Volume 5 Num-

our LAN series. Our benchmark tests use ber 20). We would, however, like to correct a misstatement the author made in the review.

> The review stated there is a bug in Instant Recall that causes users to retrieve re-

cords that do not match the retrieval request. This infrequent incident is not a bug; it is the result of Instant Recall's approximate search algorithm. While users occasionally

retrieve records that

aren't sought, the trade-off is Instant Recall's speed-it retrieves records at the rate of 110K bytes per second, where an exact search algorithm would retrieve them three times slower. In addition, the program may provide more records than requested. but it never misses records that do match the request. And the more exact the search query, the less possibile retrieving unwanted records will be.

Laura Fremont Vice President Precent Palo Alto, California

#### NO LAUGHING MATTER It is hard for me to take offense at your

characterization of our pricing of PC-Desk as "Let's Make a Deal" (First Looks, page 43, PC Magazine, Volume 5 Number 21), for we do offer dealer discounts, volume purchase discounts, site licenses, and from time to time other special discounts. This price structure, however, appeared in a magazine directed at dealers and VARs. This is a common business practice and its inherent humor cludes me. I also strongly object to your label of

# **Boost** cursor speed. cursor

# Stop run-or

With all the recent houghs over performance, it's ironic that I wo of the PC's ergonomic deficiencies have been oversioned — its slow cursor, and the tendency of the cursor to remain in motion (run-on) after a cursor key tax been released. Finally, the solution — Cruise Control." from Revolution Software.

Cruise Control is a new productivity tool for serious PC users. It boosts cursor speed, typically by 3-5X. It eliminates annoying cypicany by 3-5X. It eliminates anno cursor rua-on. And it adds hands-fre cursor navigation to any application. If you use 1-2-3, Symphony, dBASE, Reflex or Paradox, you aced Cruise Control's Auti Skid Braking. Here's what the leader of on Lotus users group said about Cruise Contro

nce I used it, I wanted it! Excellent idea ery practical. One of the best programs

sent to us for re If you use Word Perfect, MS-Word, Q&A, DisplayWrite, MultiMate, WordStar 2000, Framework, PC-Write, or SideKick, you need Cruse Coatrol's Screen Runner, the high-performance, adjustable-speed cursor

Cruise Control's namesake feature takes the drudgery out of paging through data base records, long documents, and large spreadsheets. It lets you repeat any key, hands-free — at the speed of your choice. And there's more. A Chronometer "types the time or date into your application at th current cursor position. The keyboardcurrent cursor position. The ke controlled Screen Dammer prot

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#### LETTERS

PC-Desk as "a slow SideKick-like pop-up desk accessory." In an independent study of desktop organizers, PC-Desk outscored SideKick in almost all categories of evaluation, as well as in the overall rating.

We have heard from many users and prospects regarding the unfair nature of your weak humor. I urge you to set the record straight.

Wade R Dowdle President Software Studios Annandale, Virginia

Bill Howard replies:

When we reviewed PC-Desk in "Desktop Organizers: Top-notch Efficiency Tools, PC Magazine, Volume 5 Number 10. the authors concluded: "This package has good features...[but] its operation can be awkward and certain operations can be slow."

#### GRAPHICS COM AT FAILT Mr. Ethan Winer's article "Interfacing

BASIC and Assembler, Part I" (PC Lab Notes, PC Magazine, Volume 5 Number is excellent. I find it to be especially interesting because he explains how to include a PrtSc function in a program written in BASICA. I included it with a program that produces a graphics image, and it works great in SCREEN 1 and 2. However, it does not work with SCREENS 7. 8. and 9.

I would like to print images from these higher screens but I simply do not know how to do it. I would greatly appreciate it if you could provide some information on this subject. It is quite likely that there are others with the same problem. James R. Fuhrman

Anaheim, California

Ethan Winer replies:

You are correct, my PrtSc assembler routine does not work with the special EGA screen modes, but then, neither will pressing Shift-PrtSc manually. The fault lies with GRAPHICS.COM, the program supplied with DOS for this purpose. GRAPH-ICS simply doesn't support the new capabilities of an EGA, which really is a shame. The EGA has been available for more than a year, and I think IBM should have included an upgraded version of

GRAPHICS.COM with DOS 3.2.

However, it's not all that hard to print a graphics screen using BASIC commands alone. One approach would be to use the POINT function to determine which pixels are active; another would be to PEEK screen memory directly. Though BASICA is notoriously slow when doing this sort of thing (especially compared with Microsoft's new QuickBASIC), most printers are not that much faster.

#### A SHOCKING SUGGESTION I was shocked to read Brad Stark's en-

dorsement of setting a "trap" in custom code (Power User, PC Magazine, Volume 5 Number 22). In this segment, Robert T. Collina suggested that programmers include an endless loop in a program, to be set off if the application has not been paid for by a certain date. Mr. Stark then went as far as showing a dBASE routine designed to accomplish this goal.

This type of activity is not ethical or smart business practice! A good consultant establishes an open line of communication with the client, including agreement on payment terms. The activity that Mr. Collina suggested and to which Mr. Stark replied, "I like this guy's style," will irk the client, resulting in an endless loop of anger at the programmer and no further business from the client.

Apparently Mr. Collina is not interested in developing word-of-mouth referrals from satisfied customers. I would not dream of locking up a client's computer due to nonpayment of invoices. Establishing a good relationship with the client, while potentially more time-consuming than writing an obnoxious bit of code, will go much further toward timely payment of invoices, customer satisfaction, and more business.

Theresa W. Carev Palo Alto, California

#### MAINFRAMERS SPEAK OUT

Thanks to PC Magazine editor Bill Machrone for discussing some of the technical and psychological factors responsible for the micro versus mainframe competition that exists in various quarters today (From the Editor's Screen, PC Magazine, Volume 6 Number 1). As someone who spends about equal time on PCs and main-

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PC WORLD October 1986

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#### ■ LETTERS

frames, the snobbery that Mr. Machrone alludes to has always struck me as juvenile or worse.

Mr. Machrone's comments about CO-BOL are certainly on target, but I would BOL are certainly on target. But I would add one important factor that (hopefully) would militate against the competitive nonsense: the enormous investment in, and ready availability of, highly qualified COBOL programmers. Given this resource, and the acknowledged strengths of the language, ignoring it and its heritage is

to embrace economic myopia. I eagerly await the day when both mainframe and personal computer software allow analysts to generate distributed, online commercial applications from English specifications. In the interim, let's get by using all the resources and tools that make sense, with a little less smobbery and a little

more perspective.

Eric Bank New York, New York

PC Magazine wins our thanks for informing PC users what mainframe users have known since disk technology became costeffective, that is, that batch processing is out of date, and on-line/real-time accounting is the "ware" of the future (From the Editor's Screen, PC Magazine, Volume 5 Number 21).

My company has been shipping realtime management accounting software to PC users since 1983. We find that our users don't understand why our software diffres so radically from warmed-over paperwork systems born in the 1950s, but they really don't care since they enjoy all the many benefits Mr. Machrone mentioned, and more.

Tom Murphy President ABC Systems Western, Nebraska

John C. Dvorak's article "Mainframes—Here to Stay" (PC Magazine, Volume 6 Number 1) touched heart with me. Mr. Dvorak, I agree with and support you totally the hatchet must be buried so that software/hardware developments for the micro-to-mainframe connection can prosper.

Mike Thomas Franklin, Ohio

#### CORRECTIONS/AMPLIFICATIONS

The correct address for Pro/Tem Software, maker of *Notebook II* ("TBMS: Database Power Unleashed." *PC Magazine*, Volume 5 Number 20), is 814 Tolman Dr., Stanford, CA 94305.

The Summary of Features and Performance chart for the article "Electronic Thesauri: Four Ways to Find the Perfect Word" (PC Maga-

zine, Volume 6
Number 1, page
280) contained several errors. Webster's New World
On-Line Thesaurus

by Simon & Schuster Software allows typed-in lookups, looks up synonyms for synonyms, browses alphabetically, tracks and retraces your search, and categorizes parts of speech and shades of meaning

synonyms, browses alphabetically, tracks and retraces your search, and categorizes parts of speech and shades of meaning. Microlytics' Word Finder does not look up synonyms for synonyms, browse alphabetically, or track and retrace your search.

The correct address for MLI Microsystems, developer of *Disk Mechanic*, is P.O. Box 825, Framingham, MA 01701 ("Easier than DOS DEBUG: Six Utilities for Byte-Level Editing," *PC Magazine*, Volume 5 Number 17).

The phone number for Valley Management Consultants, maker of Easytax (First Looks, page 52, PC Magazine, Volume 5 Number 22), is (215) 947-2507.

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FESTI ELEVALION

# **PC** ADVISOR



Help in selecting the best monochrome monitor, in adapting a PC to run on overseas current, and in writing flowcharts on a PC.

#### MONO MONITOR OPTIONS

I'm buying a new computer, and because all off my work is text processing 1 don't need a color monitor. I would rather steller for a less-expensive monochrome solution, and so I'm considering a Hercules Graphics Card Plus. I saw your review of Moniterm's Viking I and the Wyse WT-000 ("Big. Beautiful and Black and Wilste." Dec. Magazine. Volume 5 Nume 1 Wilstein Card Magazine. Volume 5 Nume 1 Wilstein Ca

Xavier Le Hericy Corvallis, Oregon

There's a running debate between diehard monochrome mawens and the color converts. I process words all day on an EGA system and would never switch. The monochrome character box is I by 9 dots versus 14 by 8 for EGA text, a small price to pay for color enhancements. Don't confuse an EGA's sharpness with blurry CGA text (which has an 8 h 8 character box).

Right now, video board makers are sussily rying to enhance the EGA standard to higher resolutions thanks to multisyne color monitors. But there's not a whole lot monitor makers can do to improve a monochrome image without setting their own video standard because they must conform to 1BM's MDA (Monochrome Display Adapter) refresh rate of 50 Hz and resolution of 720 by 350. There has been some mild innovation, however.

The screens of the Quimax DM-14 (Sunnyvale, Calif.; (408) 773-8282; \$219 Inamber or green and the Amdek 410 (EB.
Grove, III.; (312) 364-1180: \$250 in amber or white: \$240 in green) effer a broader horizon: they measure 14 in ches diagonally. The Roland MB-142 (Los Angeles,
Calif.; (213) 865-5141: \$373) is also 2
inches larger than a standard monitor but
offers the option of painting the screen offwhite with black characters. The display is
easy on the eyes, and a front-panel switch
lets you reverse the colors.

# OVERSEAS POWER SWITCHING I'm interested in buying an IBM PC or clone that provides the option of switching

cione that provides the option of switching between 110 or 220 volts so that I can take the machine to India.

Himanshu Baxi

Houston, Texas

Curiously, a number of PCs have undocumented switchable power supplies; you can tell only by snooping around the pow-

 There's not a whole lot monitor makers can do to improve a monochrome image without setting their own yideo standard er supply box. If you turn the switch, make sure your fuses are rated for the voltage. The IBM PC AT goes both ways;

The IBM PC AT goes both ways; there's a switch above the cord outlet. The IBM PC-XT Model 286 is smart enough to sense the current and adjust by itself. The Compaq Portable 11 gives you a choice,

but you need to buy an adapter. Replacing your power supply is a chore, but it's cheap. A-Tronic (La Puenta, Calif.; (818) 333-0193) sells a 150-watt. 220-volt box for \$55.

#### SOFTWARE FOR FLOWCHARTING

I'd like to start designing flowcharts on my PC. Are there any programs for this? William Tutley

Johnson City, New York

CAD (computer-aided design) programs will give you the tools you need. ProDesign (American Small Business Computers, Pryor, Oda.; 1918) 825-8484. 3299. Generic CADO (Generic Software Inc., Bellevue, Wash.; 1206) 462-1944; 559-951 are bargains, and after you're finished with your flowchart you'll have a powerful design tool.

For the easiest flowcharting possible, get a copy of Interactive EasyFlow (HavenTree Software Lat., Thousand Isad Park, N.Y.; (800) 267-0668; \$149.95, plus shipping). It gives you all the tools you'll need for your pro-

#### ASK THE ADVISOR

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# FIRST LOOKS

# Commodore Goes Upscale: The First DOS PC Arrives

#### PANDS ON

BY WINN L. ROSCH

A new PC clone ordinarily rates vawns rather than headlines, but when the manufacturer sells one of the most popular computers in the world, attention must be paid-even if those computers are rarely used for anything other than games.

Commodore Business Machines is not a total stranger to the business world. It has been selling a line of highly regarded PC compatibles in Europe for some time now

The new PC10 series aims for the American mass market with a competitive price and the features needed by anyone seeking an inexpensive entreé into

Initially Commodore is offering two models: the \$999 PC10-1, equipped with a single 51/4-inch, double-sided, doubledensity floppy disk drive, and 512K bytes of RAM: and the \$1,199 PC10-2, with two floppy disk drives and 640K. Both machines include ATI's versatile ATI Graphics Solution dis-

Borland's SideKick For compatibility, Commodore chose a BIOS by Phoenix. which allows the new machines to run almost any standard PC program imaginable. The processor is a Siemens 8088 and clock speed is 4.77 MHz, which together deliver performance identical to the original IBM

play adapter, Microsoft's MS-DOS 3.2, GW-BASIC, and The Commodore PC10-1 and PC10-

come standard with an ATI Graphics Solution card, offering capability with monochrome or CGA displays. RGB buy ers beware: Commodore sets the DIP puisches for monochrome and buries the proper installation advice in an appen-

PC. The ATI video adapter matches the machines to the IBM monochrome and CGA, Hercules graphics, and Plantronics color standards.

These machines are not toys. The quality of construction is an order of magnitude better than the Commodore 64 and is more than equal to the average in the PC industry though not quite up to the standard set by IBM or

On the outside, the Commodore's beige plastic front panel lacks ventilation slots but has a drive bay large enough to hold two half-height floppy disk drives. A power-on and hard disk activity indicator are built into the front-panel molding, and a keyboard jack is tucked (continues on page 35)

# RapidFile Manages Data with Extra Help for Form Letters

HANDS ON BY JOE DESPOSITO

Like the better-mousetrap builders, Ashton-Tate apparently believes that the world will beat a path to its door if it builds a streamlined file manager that is more accessible than its dominant dBASE series. To this end, the master of programmable databases has developed Rapid-File, a file manager integrated with a memo writer that lets you manage data, print reports, and prepare form letters.

RapidFile gets underway with a menu bar offering five selections: File, Layout, Records, Write, and Print. The function keys offer operations like copying, moving, highlighting, zooming, and help.

To create a new data file, you choose Create from the File menu. A table appears on the screen and you are asked to supply field name and type (text. numeric, or date).

RapidFile lets you choose three different kinds of screen layout: a table, a form, or a split screen of the table and form.

Sorting is done from the Records menu. You choose Order and are prompted to enter numbers alongside the fields you want to sort. A sort of 25 records took 2.3 seconds-slightly faster than O&A and PFS:Professional File. You may save sorted files, but Ra-

pidFile offers no file-indexing option To access specific records. you choose Locate or Select from the Records menu. (Select displays only matching reHANDS-ON INDEX

**MACE UTILITIES** New cures for lost data .... 36

4951 SEMIDISK A new approach to nonvolatile RAM......38 PIXISCANNER

A \$269 scanner—that works ......43 **PICTUREPOWER** 

Hlustrate your database .... 46 OUICK LOOKS......46 TRUE BASIC 2.0

From BASIC's developers. more pep and power ...... 50

TELEWRITER II On-line word processing .. 50

### IBM Brings the Convertible's Features Closer to the Rest of the Lap Pack

HANDS ON

RY IONATHAN MATZKIN AND GUS VENDITTO Nine months after bringing its flawed PC Convertible to market. IBM has smoothed a few of

the rough edges. The former fast ther of standards has conceded that Haves rules the communications roost and there's no reason why laptop memory shouldn't go all the way to 640K RAM.

The new Convertible still comes standard with 256K bytes of RAM but the availability of a 256K-byte add-in card (at \$390) for one of the four memory slots lets you get the memory up to 640K (128K cards are still available at \$199).



The enhanced supertwist display is standard on the new PC Conversible; the original can be upgraded for \$250.

The new Hayes-compatible internal modem is a \$450 option, in effect replacing the original IBM command set modem that was \$450 and will now sell

for \$225

Perhaps the most welcome 64,000 characters, on its status

addition is a more readable, supertwist liquid crystal display. IBM hasn't quite caught up to the industry-leading Zenith Z-181, but the new blue-on-gray screen is crisp and on par with the Toshiba T1100 Plus

The Convertible is still not a state-of-the-art laptop. Grid Systems is about to introduce a lanton that uses Lotus/Intel/Microsoft expanded memory, and Zenith is rumored to be working on a display even more brilliant than the Z-181's

But IBM is still ahead in keyboards for laptops. None other matches the intelligent design or super tactile response. Owners of the original PC Convertible are not faced with obsolescence: all of the upgrades are compatible.

FACT

PC Convertible IBM Com Information Systems Group

900 King St Rve Brook, NY 10573 (800) 447-4700 List Price: With 256K RAM and enhanced LCD screen,

\$1.995-256K RAM card \$390-128K RAM card, \$195; internal Haves-compatible modem \$450: internal IBM standard modem. \$225: screen ungrade for original PC Convertible, \$250

In Short: IBM is keeping pace with the rest of the available laptons, but it is still not close to the front of the pack even with its new screen. CIRCLE 439 ON READER SERVICE CARD

#### RapidFile

sued from page 33) two conditions from 25 records took I.8 seconds, compared with 1.3 seconds for PFS and 2.4 for Q&A. You can also Tag a record and call the tagged re-

cords when you need them. Ashton-Tate provides several useful field formats, such as currency, written-out date, and reverse name (turns "Smith. John" to "John Smith"), and you can choose between two ways to print reports-Quick and Custom.

With the Ouick Report, you use the table view and remove fields not needed in the report. You then indicate which of the remaining fields should be sorted or calculated by putting codes in a space beneath each field name

One of the easiest report features to implement is labels. Choosing Label from a layout submenu brings a label to the screen with appropriate fields. Labels can be printed in various sizes and can print one or more across the page. The RapidFile Memo Writer has many processing features, such as block moves, search and replace, and so on. Although the manual claims a memo can be up to

line the Memo Writer indicated that only around 8,000 characters were available on a 640K-

If you want to create form letters, the integration of the file manager and Memo Writer

RapidFile allows you to import and export five types of files: dBASE, Friday, PFS, 1-2-3, and comma delimited. dBASE files appear in the directory so that you may access them with Retrieve rather than



Full-down menu choices make RapidFile fairly easy to learn.

make it a simple process. You choose the appropriate file while in the file manager and then move to Memo Writer. Anytime you want to insert a field you choose Insert Field from the Merge menu of Memo

Writer

functions that can be used with RapidFile files, reports, and memos: the most powerful is the optional data validation

RapidFile brings a whole host of noteworthy features to the file management arena, es-

There are over 20 special

# FACT

Ashton-Tate

20101 Hamilton Ave. Torrance, CA 90502-1319 (213) 329-9000 List Price: \$395 Requires: 256K RAM, two disk drives, DOS 2.0. In Short: An integrated file manager and memo writer with a few nice extra features. It compares favorably in speed with the best file managers around but is priced higher. CIRCLE 440 ON READER SERVICE CAR

pecially the ability to create form letters quickly and easily. The product is also comparable in speed to some of the best file managers on the market, and a well-done tutorial and manual get you up and running quickly. Overall, Rapidfile is easy to use, but creating custom reports is difficult, and niceties such as a spelling checker are not included. At the current list price. \$395, it seems doubtful that the world will beat a path to Ashton-Tate's door.

#### Commodore (continued from page 33)

where it belongs-under the front-panel overhang.

The rear shows the five retaining brackets of the internal expansion slots, two connectors for the built-in parallel (female DB-25) and serial (male DB-25) ports, a power switch, and a

jack for the power cord. Slip off the thin steel lid and you'll see an almost empty chassis. The glass enoxy system board lining the bottom of the chassis contains all the circuitry for the CPU with an empty socket for an 8087 numeric coprocessor, the ports, and the

floppy disk drive controller. A small proprietary expansion board holds the system memory but does not require one of the five full-length, 8-bit bus, XT-height expansion slots. One slot is devoted to the 5-inch

long video card, however. The standard equipment Chinon floppy disk drives proved to be slow. You can install a full- or half-height hard disk on a vacant drive shelfbut Commodore fails to provide a spare connector from the 110watt power supply-you'll have to get your own Y-connector. A wire and connector are built into the system for attaching the front-panel drive activity indicator

Unfortunately, the instruc-

tions, which appear designed for Commodore 64-style hackers rather than business users, relegates the necessary setup instructions to a series of appendixes. For a mass market computer, lack of clear setup

Its keyboard layout is a variation of the original IBM PC AT design with enlarged Enter and Shift keys, ten left-hand functions, and a combined numeric/cursor keypad, Inexplicably, Alt lies to the left of Ctrl, above instruction is inexcusable, parthe left Shift; Esc is upper left; ticularly when an improper con-Backslash lies right of the left figuration can lead to a damaged Shift; PrtSc hides in the cup of



uration is for the video card, which is standard equipment.

display or adapter card.

The Commodore keyboard is cheap but acceptable, at least in the short run. The touch of its keys is somewhat stiff with a linear feel that gives neither tactile nor audible feedback.

Break key is squeezed in next to Backspace. Commodore offers two monitors: the IBM-style monochrome 1901 and the 1902,

the Enter key; and a dedicated

which accepts both IBM-style detine Tie

: IBM PC-XT-

FACT FILE

> Commodore PC10 Series Commodore Business Machines Inc 1200 Wilson Dr

West Chester, PA 19380 (215) 431-9100 List Price: PC10-1 with 512K RAM, one floppy disk drive. DOS, \$999; PC10-2 with 640K

RAM, two floppy disk drives, DOS, \$1,199 Requires: Color or monochrome display

In Short: A line of ordinary PC-compatible computers with no performance advantages except full PC expandability and a competitive retail price CIRCLE 434 ON BEADER SERVICE CARD

RGB and Commodore 64-style split-video inputs and features a built-in speaker. Display sharpness and color saturation appear on a par with IBM's Personal Computer Color Display. The Commodore PC10s

compare favorably in many respects to other cheap clones. Considering the very high demand for these competitive machines. Commodore's simple but effective PC clones appear destined for success.



re PC-20 (and the PC-10) run even with the IBM PC-XT on just about every to access, in which the PC-20 proves to be slow. The Tandy 1000 SX is co-20 in price, and while it runs faster than the PC-20, the 1000 SX's exper

#### rmance Times

Product	NOP	sees instruction Mix	Disk Access (milliseconds)	9	1001
IBM PC-XT	10.14	32.02	234 70		Acres Acres
Commodore PC-20	10.11	32 13	306 29		lestruction
Tandy 1000 SX	8.90	25.32	242 50	101	Mit

# Mace Utilities 4.0: Best Data Recovery There Is Gets Better

#### HANDS ON

BY EDWARD MENDELSON I came to appreciate Mace Utilities in a moment of panic.

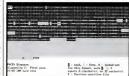
It was 2 months since my last weekly backup, and one of my directories had just disappeared. I was trying some dangerous experiments with publicdomain utilities. After removing one skittish program from memory, I tried to open another-and found that it didn't exist. When I looked in its directory, all but the first few entries had vanished-I was the victim of a Trojan Horse.

The Norton Utilities can bring back deleted files, but Norton could find no files to bring back. A hundred files had checked out of my hard disk, and they'd taken the towels and

coat hangers with them Paul Mace Software's ads for Moce Utilities claim it can rescue a disk from just about any disaster short of fire or flood. I had nothing more to lose, so I

gave Moce Utilities a try. Within a few minutes of loading the program, Mace Utilities reported that it had restored my directories. When I

ses, and, in its latest revision, the amazing product packs in even more value for \$99. It comes with a head-parking routine and a couple of speedup exited the program, I found evutilities: Vcache, a flexible and



Mace Utilities' graphic map of a 20-megabate hard disk uses a P to indicate files that won't be moved when the program reorganizes the disk.

22 in (P1 Position-meanities. Head 3 sector B 23 in (P1 Position-meanities. Head 3 sector 12

ery missing file, exactly where it belonged

Mace Utilities has saved hundreds of disks from such cri-

reliable disk-cache, and Vscreen, which speeds up screen writes. If you install Mace Utilities before disaster strikes, it can

make a complete recovery from an accidental format or from damage to a FAT (file allocation table) or boot sector. Impressive as this is, Moce Utilities can do something no other program even attempts: it recovers much of the contents of an accidentally formatted hard disk when its recovery kit was never on the disk at all.

Totest Moce Utilities' ability to restore a disk on which it hadn't been installed. I formatted the hard disk on an AT at PC Labs. The program promises that in this situation it will give you all unfragmented files in all subdirectories, but that fragmented files will be incomplete and you will lose all files in the

More Utilities did everything it claimed-although in a more frightening way than the manual had led me to believe. After reporting that it had recovered the subdirectories, the program displayed a seemingly endless series of messages that said "Error reading disk!" The manual says nothing about these messages, and they gave me the clear impression that I would never see those files again.

As it turned out, nothing at all was lost. Mace Utilities' error message referred to areas of the disk that had never carried any data at all-sectors and tracks that had been locked out by the low-level formatter. I learned all of this only by talking with Paul Mace.

If you lose a few files rather than a whole disk. Mace Utilities provides a safe and smart Unerase function I found that Mace Utilities frequently recovered files that Norton told me to kiss good-bye forever.

Moce Utilities also helps prevent disasters from happening. Its Diagnose/Remedy function tocks out had and "suspeet" clusters and moves endangered data to a safe harbor. DOS's FORMAT and Norton's Disk Test notice bad clusters only when it's too late.

Even when nothing is seriously wrong with a disk, Moce Utilities can improve its efficiency. It saves DOS time by squeezing deleted entries out of

(continues on page 38)

# FACT

Mace Utilities, Version 4.0 Paul Mace Software 123 N. First St Ashland, OR 97520 (800) 523-0258 (503) 488-0224

List Price: \$99; upgrade from earlier versions, \$30 with original disk. Requires: 256K RAM (32-Mbyte disk or larger requires 512K), two disk drives, DOS

In Short: An extremely flexible and powerful utility for restoring damaged disks and files. Can restore a formatted hard

disk. Works on any DOS storage device. Not copy protected. LE 421 ON READER SERVICE CARE

#### **How Does Mace Do It?**

When FORMAT.COM formats a hard disk, it leaves the data intact and wipes clean only the root directory and the FAT (file allocation table). (The lethal exceptions are ATT's MS-DOS 2.11 and Compag's MS-DOS 3.1, which overwrite every byte on the disk )

An installed copy of Mace Utilities reconstructs the FAT and the root directory using copies it keeps in a file called BACKUP, MgU. Mace Utilities updates this file every time you boot up. But an uninstalled copy

of Mace Utilities has no stored data to work from and must rebuild the directories and FAT out of nothing. It sounds impossible, but Mace Utilities does it.

Paul Macc won't give away all his secrets, but his basic technique is simple. He searches every sector for the characteristic signature of a subdirectory: a dot at the first byte, two dots 32 bytes later. When it finds a subdirectory, Mace Utilities reads the names of its files, their

lengths, and the location of each file's first cluster. This is all the information the program needs to restore the unfraemented files. But with fragmented files, Mace Utilities can find only the clusters in the initial fragment. If necessary, you can re-

construct the fragmented files, cluster by cluster, with Mace Utilities' Undelete

-Edward Mendelson

root directory.

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ert Alsop, PC Le

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- 1	\*\*\*\*\*	Send to: Brøderb	and Software-Direct
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	. Rwaerana.	94913-2947. To or 415-479-1185 8:00	der by phone, call 2

# SemiDisk Plugs Nonvolatile RAM into an Expansion Slot



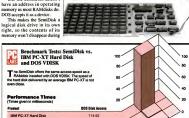
Calling the 4951 SemiDisk, from SemiDisk Systems of Beaverton, Oregon, a nonvolatile RAMdisk would be telling only part of the story. The SemiDisk is built from 256K-bit RAM chins on a full-length internal board-and that makes it a RAMdisk. It comes with its own plug-in power supply to keep your data from going -that's the nonvolatility.

But the SemiDisk doesn't have an address in operating memory as most RAMdisks do. DOS accepts it as a device. This makes the SemiDisk a

a boot, warm or cold. It's fast and isn't affected when the system is accidentally hung. The optional battery backup unit can keep data alive during power down, protecting the memory for up to 3 hours when the cord is pulled or the lights go out.

mal applications no jumpers have to be changed. Installing the hardware is only a matter of finding an open full-length expansion slot. A system driver is included so the SemiDisk can get DOS's attention during boot up. You just have to add a line to





**Mace Utilities** 

DOS VDISK in extended RAM

directories. Its Condense function closes gaps between files and stitches fragmented files

back together. When Mace rearranges files, it knows better than to tangle with copy-protection gangsters.

Most protection schemes act as strict enforcers, ready to break the kneecaps of any protected program that moves to a different spot. Mace will not disturb files created by the most prominent goons in the protection racket, but it does have some run-ins with one or two newcomers whose mug shots are

DOS Diek Access benchmark lest measures the time it takes to do a random sector read up buffers are set at 3 and the interferor factor is left at the driver's default setting. This test at

lead to the BIOS and hardware times. The test program performs the in the DOS disk partition. The average result is shown in milliseconds.

printed in the manual. The newest version of Mace handles disks with up to 8,000

DOS

**Relative Times** 

Hard Disk at 100)

files and with capacities of up to 256 megabytes (Version 3.0 was limited to 3,000 files and 32-megabyte disks). If you are not now using

Mace Utilities, what are you waiting for?



4951 SemiDisk SemiDisk Systems Inc.

P.O. Box GG Beaverton, OR 97075 (503) 626-3104

List Price: With 512K RAM. \$495; with 2 Mbytes RAM, \$795; battery backup unit. \$130

Requires: Expansion slot. DOS 2.0 or later In Short: Nonvolatile R AMdisk on an expansion card. RAM-speed disk access without using the main memory

CIRCLE 424 ON READER SERVICE CA SemiDisk's device driver.

The manual is meager, poorly realized, and full of technical information that is guaranteed to give novices the creeps. I'd advise SemiDisk users to follow the first page of installation in-

structions and ignore the rest. The SemiDisk has to be formatted like a floppy or hard disk every time the power goes down-whether you pull the plug or the electric company does. This makes the optional battery backup unit a necessity. Users without the battery backup can use a SemiDisk utility that automatically formats the SemiDisk on power up.

SemiDisk Systems has two versions of its card: a 512K-byte add-vour-own-RAM special and a 2-megabyte model already loaded to the gills.

The SemiDisk isn't for people who want a hard disk-20megabyte hard disks are nearly half as cheap as a 2-megabyte SemiDisk-but it's ideal for traditional RAMdisk applications: CAD programs, behemoth spreadsheets, and database operations

Its performance and cost are roughly equal to that of Santa Clara Systems' BATRAM. which is \$1,895 for a 4-megabyte external system, expandable to up to 80 megabytes. The SemiDisk is more appropriate for applications that need to keep a relatively small amount of data within RAM distance.

# Interoffice Memo.

A single MaynStream backs up all the PCs in your office, file by file!

Announcing: Software Version 2.0!

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Hard drive users know tape backup is indispensable, but equipping each of your PCs with its own backup is costly. That's why we developed the MaynStream, our

lightning-quick, file-by-file tape backup system. Just snap the MaynStream onto any PC equipped with a low-cost MaynStream controller. Simple menus guide you through backup in seconds and restoring data is just as easy. So when your hard rivhe forgets to treat your files like your business depends on them, the MaynStream remembers. Stream, our important functions.

Margarian Samura (Margarian (Marg

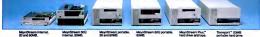
The MaynStream makes customized backup a reality, giving you unprecedented control over one of your computer's most important functions. Options include Metworking, which is received to work with all popular I Alexander

designed to work with all popular LANs including Novell, 3COM, and IBM's PCNet: The MayniStream will not only back up a network while the network is up and running, but will actually back up one files automatically once they're closed! No other system currently on the market can to his! The MayniStream's Other tectures include Automatic Severy up select liles, directories, and subdirectories, Archiver, Verify; and Backup Macroe for unpreedented

Other Powerful Systems for the PC.

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# But we're the mothers who do all the work.









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to that personal computer, but stayed close to home and brought the little PC up. We were first to devise a fully functional link between the IBM PC and the System 3X minicomputers. First to ex-

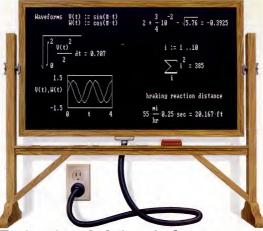
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Math

CIRCLE 154 ON READER SERVICE CARD

# Best Bargain in Scanners: The \$269. 200-dpi PixiScanner



BY TOM STANTON If you have looked longingly at scanners but haven't been willine to spend a couple of thousand dollars just to see if it can work all the magic you hope for-here is your chance. For ector found on most PC se-

The software can be used on a two-disk-drive system or on a hard disk. The PixiScanner supports the CGA (2- or 4-color), EGA (from 2 to 16 colors), Hercules monochrome/graphics card, and Tandy 1000 (2-, 4-, or 16-color)

can use any of the popular

screen-grabber programs, including PC Paint, PC Paintbrush, and Dr. Halo II, to convert scanned images for laser The menu-driven software is surprisingly sophisticated and relatively easy to use. Function

printing scanned files, but you

keys advance you forward and backward through a series of menu windows. To scan a document, you open the scan window and make selections for screen resolution, file type, and scanning parameters.

The PixiScanner lets you adjust the darkness, color, intensity, and pixel pattern, do x- or yaxis scaling, and select the scan area. Parameters can be saved and loaded from disk as needed. I was surprised at the range of scanning selections available, even on a CGA. Users with an EGA and a color monitor should see some dramatic results

The actual scanning is somewhat time consuming because the CCD covers only a small area. A 5- by 5-inch graphic takes about 3 minutes to scan: a full page takes about 10 minutes. However, balanced against the price, the results are well worth the wait.

The PixiScanner's automatic halftoning does an excellent job



pands to fit over most due motris print. heads. Three mount the holes in the adapter allow you to mount the antical eve for optimum results. The soomer has its OWER DOWNER SWOOD and plugs into a 25pen serual poet. A Velcra strip attuckes to your

The PreiSconner's

metal string-looded

mounting and You can select communications and printer port assignments and use a mouse, light pen, or joystick instead of the cursor keys. You can select print drivers to control the scanner and print scanned files or

write your own driver based on

the existing selections. Laser

only \$269 you can buy Micro Technologies' PixiScanner, a sonhisticated scanner system that attaches to a dot matrix printhead Don't let the price fool you:

the PixiScanner, which includes both hardware and software, scans in black and white or color with up to 200-dot-per-inch res-

#### Attaches to Printer

The PixiScanner uses a compact CCD (charged coupled device) attached to a spring-loaded adapter that fits over the printhead of most dot matrix printers, including Epsons, IBMs, Okidatas, and Geminis. If the standard assemblies don't fit your printer, MTI will modify one on request.

The CCD connects to a black box, which contains the power supply, a reset switch, and a cable that plues into a standard RS-232 serial port. MTI uses a 25-nin male connector, so you may need a male-to-female adapter to plug it into the male



PixiSconner won't dazzle you with speed, but its finished product is as good as you'll get with many higher-priced scanners.



Micro Technologies Inc. 921 Royal Heights Rd. Belleville, IL 62223 (618) 233-2314 List Price: \$269 Requires: 256K RAM serial port, printer, DOS 2.0 or later. In Short: A 200-dot-per-inch scanner that attaches to the printhead on most popular printers. The software gives you great latitude in using the scanner images.

CPICLE 422 ON READER SERVICE CARD

with photographs and pictures from magazines, as well as standard line art. Images can be saved in any one of six file formats, but the most useful is the default scan file, which can be reloaded, printed, or saved in one of the other formats. The PixiScanner supports the Macintosh (READMac), simple binary (Screen), and RLE (runlength encoded), a popular format on CompuServe.

I had only one problem with the PixiScanner: focusing the CCD on my Okidata 92. The software includes a nice focusing option, but since my CCD had to be mounted atop my printhead, I had to fuss with it before I got the right reading. Once focused, the scanner performed beautifully. Epson users shouldn't have this problem because the CCD is mounted on the flat side of the printhead and should focus easily.

#### Perfect for Light Use The PixiScanner hardware is

not intended for a heavy production environment, and it does not have all of the automatic features found on other scanners. However, the software is on a par with systems costing three times as much.

If you want to incorporate an occasional photograph, sketch, or logo into documents, you'll find the PixiScanner is a bargain, plain and simple, and is well worth the time and money you'll spend on it.

Sharp Electronics Corp.'s \$3,399 ZY-

1000S PC innovertee packs the function

of a PC, word processor, printer, and

that of an office electronic typewriter.

Pop-up Utility from

Envelopes Simply

**Quaid Software Prints** 

Sometimes life's simplest tasks

are the most irritating. If The

Envelope Please, from Quaid

Software, does what it claims

to, then it may put an end to the

frustration that arises from ask-

ing a printer to do a seemingly

simple task: to quickly and cor-

rectly print an address on an en-

veloce. The \$39 memory-resi-

dent software pops up after a

letter has been written. A "hot

key" brings up an on-screen frame that you position over the name-and-address text of the letter-and the program does the rest. Quaid says. Also, the program can print sideways, for maximum ease of operation. The Envelope Please works with most popular resident and nonresident software. Quaid says, including WordStar, Symphony, dBASE, and SideKick. It supports Epson-compatible friction-feed dot matrix or daisy

typewriter into a footprint no larger than

#### ■ NEW ON THE MARKET ■ JONATHAN MATZKIN

#### Sharp integrates the Typewriter and the PC To Create ZY-1000S

It looks like an electronic typewriter with a periscope. Sharp Electronics

Corp. has dreamed up a combination PC/electronic typewriter designed to coax computerphobes into using a PC.

The \$3,399 Sharp ZY-1000S can operate simply as a fullfunction electronic typewriter,

Other standard couin-

ment includes RS-232C and

parallel ports, an external

floppy disk drive interface,

and an RGB color video-out

Gridlite runs for 3 to 4 hours

on a single charge of its nick-

el-cadmium battery pack,

which weighs 12 ounces.

List Price: Gridlite, with 128K

RAM, single internal 3V-inch

screen, \$1,750; optional 640K

RAM, \$600; optional 1/2 Mbyte

EMS RAM, \$295; optional 1

Mbyte EMS RAM, \$395; exter

nal 3%-inch pocket disk drive.

\$295: internal 1.200/300-box

disk drive, supertwist LCD

Grid Systems says the

interface

or with the flip of a switch it can become a fully compatible MS-DOS computer. PC features include twin 51/4-inch disk drives. 448K bytes of RAM, an Intel 80C86 processor, and an 80character by 25-line supertwist LCD display.

Sharpwriter word processing software, which is based on Samna Corp. 's Samna Word IV, is hundled with the ZY-1000S Since the typewriter and PC parts of the unit are controlled by separate processors, an application can run on the PC while the ZY-1000S is used as a typewriter. An RS-232C interface allows external communi-

List Price: Sharp ZY-1000S, with Sharpwriter word processing software, \$3,399. Sharp Electronics Corp., Sharp Plaza, Mahwah, NJ 07430: (201) 529-

CIRCLE 434 ON READER SERVICE CARD

#### Surge Protector Is Offered as a Lapton Traveling Companion

If you've spent several grand on a laptop computer, you probably feel a twinge of fear each time you plug it into an unprotected hotel room AC outlet.



The MPS(22)-2 Portable Computer Protection System, \$185, from Electronic Specialists, provides the sort of protection for laptops that users routinely use for their deskton machines.

Electronic Specialists has introduced a product that may ease your mind. The pocketable 3- by 6- by 2-inch MPS(22)-2 Portable Computer Protection System (\$185) incorporates an AC line surge supressor, a

#### Laptop Breaks the 640K RAM Barrier And Weighs in at Less Than 9 Pounds

get more powerful as they get smaller. The Gridlite. \$1,750 from Grid Systems Corp., is the first laptop to offer Lotus/Intel/Microsoft-compatible expanded memory-up to 1 megabyte (\$395)-and weighs in at a mere 81/2 pounds. It's built on an 80C88 processor running at 4.77 MHz.

comes with an 80-character by 25-line supertwist LCD screen and an internal 316. incb microfloppy disk drive. A 1.200/300-bit-per-second Hayes-compatible internal modem (\$495) is also avail-

In addition to the expanded memory and 640K bytes of RAM, the Gridlite can accommodate 1 megabyte of snap-in ROM software cartridges. The computer

modem, \$495. Grid Systems Corp., P.O. Box 7535, Mountain View, CA 94039; (800) 222-GRID. CIFICLE 427 ON PEADER SERVICE CARD

The Gridlite, \$1,750 from Grid Systems Corp., breaks new ground with its exed memory aption (up to 1 mesabyte) and light weight (under 9 pounds).

wheel printers. Quaid promises versions for other printers in the future. List Price: The Envelope Please, \$39. Regulres: Epson-compatible friction-feed dot matrix or daisy wheel printer. Not copy protected. Quaid Software Ltd., 45 Charles St. East. Third Floor, Toronto. Ontario Canada M4Y 152: (416)

CIRCLE 432 ON READER SERVICE CARD

061,8243

PC MAGAZINE . MARCH31.1987

#### PFS:Network Organizes Multiuser Access to Three PFS Applications

Software Publishing Corp. has introduced PFS:Professional Network, a \$499 LNA program that provides multisure access to PFS:Professional PEIR. PFS:Professional

among all three programs.

Professional Network establishes a subdirectory for each user that protects individual system configurations, macros, and dictionary files. Personal subdirectories cannot be accidentally overwritten by other network users, and individual user files are protected from unauthorized access by file locking.

Data files that allow sharing of word processing text, spreadsheet templates, and file data for reports and mail-merge can be created in *Professional Net-*work. Data integrity is ensured

because only one user at a time can access these shared files. Professional Network features the interface, menus, and

tures the interface, menus, and context-sensitive help found in other *Professional* software. Software Publishing points

out that Professional Write boosts the cost-effectiveness of Professional-series software. Five copies of Professional Write, for example, would cost \$1,000, but one copy plus Professional Network costs only \$700.

Use of additional Professional Network packages adds groups of five users to the system, up to a maximum of 500

users. The software is supported by IBM's PC Network and Token-Ring Network. The package is also compatible with 3Com's 3+Share; Novell's Advanced NetWare!86, Version 2.0 or later; and Tandy's

List Price: PFS:Professional Network, \$499. Requires: 512K RAM, local area network with hard-disk-equipped file server, DOS 3.1 or later. Not copy protected. Software Publishing

Corp., 1901 Landings Dr., P.O. Box 7210, Mountain View, CA 94039; (415) 962-8910.

CIRCLE 428 ON READER SERVICE CARD

phone line surge suppressor, and a static discharge plate. List Price: MPS(22)-2 Portable Computer Protection System, \$185. Electronic Specialists Inc., 171 S. Main St., Natick, MA 01760; (800)

When installed on a network.

# Add-on Memory Board For Compag 386 Runs

32-bit Mode, 16 MHz
The 386 Memoire (5745 with
T

List Price: 386 Memoire, with 1 Mbyte RAM, \$745; with 2 Mbytes, \$1,095. Computer Peripherals Inc., 2635 Lavery Ct., #5, Newbury Park, CA, 91320; (800) 854-7600.

CIRCLE 430 ON READER SERVICE CARD

#### Star Micronics Debuts 9-Pin Printer for the Mid-Priced Market

In the highly competitive midpriced dot matrix printer market, reasonably inexpensive units continue to add features that have been associated with higher cost. The \$499 ND-10 9pin printer, from Star Micron-



ies, offers a combination of reasonably fast claimed print speed (180 characters per second in draft mode, 45 cps in near-letter-quality mode) and convenient features.

The ND-10's touch-pad control panel selects more than 13 print and format functions.

thereby cutting down on the need to play with DIP switches in or issue software commands. Ided Margins, type style, page velength, print pitch, and top-of-form are among the front-panel on selections.

Tractor and friction feeds are built in, and the printer will ac-

cept cut-sheet paper with a maximum width of 8½ inches, or fanfold paper up to 10 inches wide. A parallel interface is standard, and an RS-232C op-

tion is available. The standard buffer is 12.6K bytes. Graphics emulations include the Epson FX, IBM 5152 Graphics Printer, and IBM Pro-

printer, according to Star Micronics. List Price: ND-10, \$499. Star Micronics Inc., 200 Park Ave.,

Micronics Inc., 200 Park Ave., #3510, New York, NY 10166; (212) 986-6770.

CIRCLE 433 ON READER SERVICE CARD

# Bubble-Memory Board Protects Data In the Face of Adverse Conditions Magnetic disk media are not de- | Access time of the PCH-3

Magnetic disk media are not designed to operate reliably in many industrial or otherwiseunfriendly work environments. The PCH-3 Bubbl-Board, \$1,257 with ½ megabyte of RAM, from the Bubbl-Tee division of PCIM, is aimed at just such difficult applications. The bread provides up to 1%

megabytes of nonvolatile mass storage on a standard full-length PC adapter card, and it is unaffected by dust, smoke, and airborne dirt, Bubbl-Tec says. Expansion to 6 megabytes is

possible with available add-on boards, and removable bubblecassette capability can be added with Bubbl-Tec's BD-series Bubbl-Dek. system averages below 20 milliseconds, and the effective data transfer rate to and from the bubble device exceeds 190K bits per second. System power is derived from the host PC bus.

List Price: PCH-3 Bubbl-Board, with 1½ Mbytes of on-board storage, \$2,297; with 1 Mbyte, \$1,789; with ½ Mbyte, \$1,257. Bubbl-Tec, 6805 Sierra Ct.. Dublin, CA 94568; (415) 829-8200.

CIRCLE 429 ON READER SERVICE CARD



Adverse operating conditions that rule out magnetic disk media are less of a problem for the PCH-3 Bubbl-Board, from Bubbl-Tec. The board can be configured with up to 1½ megabites of nonvolatile RAM (\$2,297).

## PicturePower Merges Video Images With dBASE III Plus-Compatible Files



### HANDS ON

BY MITT IONES PictureWare's PicturePower harnesses the awe-inspiring power of AT&T's Targa 16 video board and brings images captured with a video camera into

dBASE III Plus databases. Capitalizing on the Targa's ability to display and digitize live video images, Picture-Power makes it easy to capture, resize, and annotate photo-

graphs. You can then integrate the images with a dBASE III Plus database or with a database you

created using PicturePower. PicturePower can't compete with more extravagant packages, such as AT&T's TIPS, when it comes to giving you the graphics and photo-retouch features a serious artist would demand. But for integrating photographs with databases, the product's image-editing features are ample, and Picture-Power is a breeze to use.

Clear instructions and diagrams guide you through not only the program installation but also installation of the Targa board, video camera, and analog monitor. The software in-

stallation takes only minutes. PicturePower's interface. which requires a Microsoftcompatible mouse, centers around a point-and-shoot menu across the top of the screen.

You can also embed notes

and simple graphics into images. You've got your choice of

you can specify proportional mode to keep from distorting

PicturePower PictureWare Inc

FILE 111 N. Presidential Blvd. Bala Cynwyd, PA 19004

FACT

(215) 667-0880 List Price: \$945 Requires: 512K RAM: Microsoft Mouse or compatible;

AT&T Targa 16 Display/Capture Board: RGB or composite analog monitor; color video camera. Hard disk is recom-

mended In Shurt: An easy-to-use package that allows integration of video images with dBASE III Plus files. Not copy protected. CIRCLE 425 ON READER SERVICE CARD

Employee Identification Employee Hame: Laura Johnson Secounting Besartsentt

Duplay forms allow you to call up pictures through dBASE III Plus or, as above, Pic-

Locations

turePower's database manager.

live images as the video camera cantures them. You can save the image at any time with a click of the mouse

You can trim, enlarge, or shrink images using Picture-Power's sizing options. You choose the size of image with rubber-banding outlines, and

The Capture option displays 32,768 colors for text and graphics, but you'll find only one size of text

Icon 4956

PicturePower's Airbrush option is its most fun feature, if not the most useful. You can zoom in on any portion of an image and change the color of individ-

ual pixels or groups of pixels. If your database needs are simple, you can get by with PicturePower's simple database generator. PicturePower databases are easy to create and can hold as many picture, number, or text fields as you can fit on the screen. You can move through and query Picture-Power databases easily, but

don't expect to find more nowerful abilities such as sorting and report generation; that's where dBASE III Plus comes into play. You can append picture

fields to a dBASE III Plus file and display the pictures, along with other fields, on a Picture-Power display form. You access the PicturePower forms and activate the Targa board through a series of Picture Power commands you include in your dBASE programs.

On the whole, PicturePower is well thought out. The package even includes communications options that let you send images to other sites

Aside from the section involving dBASE integration, which probably will cost you a call or two to Picture Ware's support line, the documentation is well written and serves as an excellent tutorial

Personnel, sales, and security operations will have no trouble finding applications for this unique combination of visual and computing power, but it doesn't come cheap. The Targa 16 board alone sells for \$2,995. PicturePower is \$945, and the

video camera should run another \$1,000. PictureWare sells a complete color setup for \$6,230 PictureWare also offers a black-and-white version of PicturePower, which uses the less

expensive Chorus PC-EYE board in lieu of the Targa. That board sells for \$495; PictureWare sells the complete setup for \$3,040.

Another drawback, although understandable, is the amount of disk space PicturePower will consume if your application is large. A full-screen image will occupy 320K bytes. After trimiming a full-screen portrait you might consume as little as 50K bytes per picture.

#### Using the Amazing Targa

AT&T's Targa video board series drew oohs and aahs when it was released over a year ago. The boards' amazing color capabilities (lowend boards can display 32,768 colors, high-end boards up to 16 million) pushed the state of the art for PC boards to a new plateau. Only recently have third-

party vendors started to market products that take advantage of the Targa's image display/cacture carabilities. Among the more elaborate offerings is Royal Recovery Systems' Instant Image Talk, which can store up

to 24,000 video images or

10-second audio frames on an 8-inch videodisk. You can link video and audio frames to produce slide show presentations or search the database for specific West End Film has re-

leased several products using the Targa, including Artwork, a 3-D modeling program, and Videowork, an animation program.

Media Cybernetics also took advantage of the Targa's abilities by developing Halo-Vision, essentially a new version of Dr. Halo II with video input capability.

-Mitt Jones

# Flash-Up Windows puts menus and help windows in everybody's software.

# Theirs.



# Theirs.



## Theirs.



# And even yours.



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Just like keyboard macro utilities, Flash-Up Windows can be used to send repetitive keystrokes and commands automatically. But Flash-Up Windows lets you select your macros from menus—the same Flash-Up menus you use in all your software.

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#### OUICK LOOKS

# **GEM Draw Plus: Easy Color Graphics**



#### HANDS ON

BY CHRISTOPHER BARR Digital Research's GEM Draw Plus is an easy-to-use drawing package that could dress up your presentations with very little effort. Like other GFM anplications, it works from within GEM Desktop, which you get

when you buy Draw Plus. The program uses a Macintosh-type icon interface, helping you create 16-color (with an EGA) pictures with text. If you own GEM Graph, you can import graphs and use Draw Plus to create symbols and further enhance any charts created with GEM Granh.

Open a file in Draw Plus and you're into a window with a tool kit at your left. You can either create a new picture or copy an image from a library file. Draw Plus comes with 43 drawings in

a library; you can add as many images as you like. Eight drawing elements are at your disposal: circle, rectangle, polygon, rounded rectangle, arc, line,

sketch, and text

Drop-down design menus allow you to select different styles for the element used. Any solid shape you draw, such as a circle, a polygon, and so on, can be filled with any of



GEM Draw Plus's menu bor provides ready access so major features, while the icons on the left offer drawing options.

How to Enhance Your PC, XT Keyboard solid tactile response-they're PE HANDS ON

BY PEGGY GAVAN When IBM unveiled its Enhanced Personal Computer Keyboard, it made the offer only to owners of the RT PC.

else was left in the dust. Datadesk International has stepped in with its Turbo-101 Enhanced Keyboard. The layout and enhancements are patterned after the IBM enhanced keyboard-there's a dedicated cursor pad, and 12 function keys line up along the top of the keyboard. But the Turbo-101 will work on your IBM PC, PC-XT, PC AT, PCjr, AT&T, or

the new 8-MHz PC AT, and the PC-XT Model 286. Everyone

compatible. WordStar users will love one option that lets you switch the Ctrl and CapsLock keys' scan codes, so you can have them in their familiar positions. Datadesk provides left Ctri and CapsLock keytops to help you

keep track of the positions Better vet, the Turbo-101 offers dedicated Alt-F9 and Alt-F10 keys in place of the BIOSignored F11 and F12 keys. You

can return to F11 and F12 by manually removing a diode. The keys don't have IBM's

quiet and soft. But the Turbo-101 gives you a nice wide Enter key and a free copy of Borland's Turbo Lightning. All in all, the Turbo-101 saves the better features of the old PC keyboard while giving the 16 colors and 38 patterns from the design menus.

The work area displayed can be adjusted to show the entire picture (WYSIWYG) or simply a tiny portion. Elements within the picture other than text can be rescaled to any size and dragged to the desired location. Pictures can be drawn on top of one another, providing a layered look. but don't plot 3-D-type pictures: Draw Plus will overprint lines.

Draw Plus is among the easier, more elegantly designed drawing programs, but to exploit its graphics potential fully you'll need the other GEM graphics products-GEM Paint, GEM WordChart, and GEM Graph

List Price: GEM Draw Plus, \$299. Requires: 384K RAM, graphics adapter, mouse, DOS 2.0 or later. Not copy protected. Digital Research Inc., 60 Garden Ct., Monterey, CA 93942; (408) 649-

3806

CIRCLE 435 ON READER SERVICE CARD you the benefits of the enhanced

List Price: Turbo-101 Enhanced Keyboard, \$149.95. Requires: IBM PC, PC-XT, PC AT, PCjr, or compatible. Datadesk

International, 7650 Haskell Ave. Van Nuvs. CA 91406: (818) 780-1673. CIRCLE 436 ON READER SERVICE CARD

# NewsMaster Dresses Up Newsletters

HANDS ON Gallery libraries. BY JONATHAN MATZKIN But the program isn't intend-

Desktop publishing for \$100? Well, yes if you need to jazz up your newsletters, but no if you have anything more ambitious in mind. Unison World's NewsMas-

ter does offer many of the capabilities of its far more expensive

You can mix text and graphics on a page from a selection of fonts and artwork. NewsMaster imports ASCII files and is compatible with Unison's Print-Master and PrintMaster Art

ed for large or complex documents. Documents can have only one horizontal headlinebox per page. Additional headlines must be added within columns by using large characters. Functionally, NewsMaster

uses easy-to-follow menus. But learning the program takes considerably longer than the one hour claimed by Unison, Because the documentation confused me, I had to exit the tutorial several times and start over NewsMaster is a true desktop publishing package, albeit a

modest one. Taking the time to get to know the program will reward anyone looking for a way to produce lively, relatively simple newsletters.

List Price: NewsMaster, \$99.95. Requires: 256K RAM, DOS 2.0 or later. Not copy protected. Unison World Division of Kyocera Unison Inc., 2150 Shattuck Ave., #902, Berkeley, CA 94704; (415) 848-

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like Windows and TopView. Set it up once and Software Carousel remembers forever. Better still, Carousel will look for the programs you use most often and optimize them for quickest

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# True BASIC Speeds Execution. Uses Memory Up to DOS Limit



BY ETHAN WINER When John Kemeny and Thomas Kurtz designed BASIC back in 1964, they probably had no idea it would become the most popular programming language in the world. Besides being very easy to learn, BASIC has also evolved greatly since its first ap-

pearance. However, according to its developers, that evolution has been less than ideal. Because every brand of PC uses its own unique dialect, they argue, meaningful standards are needed. Their own brand of the language, True BASIC, ad-

dresses these problems and then some In its latest release Version 2. they have added a host of powerful features, while main-

taining compatibility across all of the machines for which True BASIC is available. But it's very different from the BASICs

I grew up on. Intermixed with many im-This code is displays clayed time in the apper-right

I corner of the scree chere start\_time, \$1, \$ open \$1: screen 8, 8, 8, 1, 1

cell Clock onk Clock t " time cleer

print recedit - start time. [) Telapsed time, in F7

18 lines, 445 bytes Free sencry 300064 bytes Sirectory AN

True BASIC's TIME function returns seconds elemed since midnight. You can use the function to add clocks to your applications.



True BASIC, Version 2 Tone BASIC Inc. 39 S. Main St. Hanover, NH 03755 (800) TRBASIC List Price: \$149.90

Requires: 192K RAM, DOS 2.0 or later In Short: This latest revision of

the version of BASIC developed by the founders of the language adds more support for various devices and speeds execution. Not conv protected. CIRCLE 406 ON READER SERVICE CA

increased speed, as well as support for the Hercules graphics

Unlike other recent BASICs. True BASIC uses all of memory without restriction and offers a wealth of built-in functions such as ROUND, MAX, MIN. (continues on page 54)

# Telewriter: An On-line Editor

HANDS ON BY CHRISTOPHER JOHNSTON

Telewriter II from R&S Micro Services is a hybrid that combines a word processor, a communications program, and a spreadsheet function or two. It's especially well suited to professionals who scour information services like CompuServe for data and who need a way to

manage it. The program moves data directly into its word processing environment so that you can edit it before printing or writing to

With a remote computer you can edit text locally, using all the features of Telewriter II's word processor, while the program is on-line and before you upload your text

This feature is a comfort to professionals who subscribe to any of the electronic mail net-

works (such as MCI Mail) that charge by the message instead of by the minute. These companies tend to have primitive online editors to strong-arm users into composine messages offline and uploading them later, thus spending less time on the system.

Telewriter II's commands are tied to the ten function keys and are two levels deep. The first laver is composed of primary word processing commands. The second layer (accessed through the F10 key) is for tele-

communications and disk operations

Word processing operations in Telewriter II work through combinations of function keys and the Home, End, Del, and Ins keys, a setup reminiscent of MultiMate.

Besides the frills you might expect from a powerful editor-search and replace, splitscreen editing, newspaper-style columns-Telewriter II has a

sort function that's great for alphabetizing ranges of information or arranging groups of numbers. A calculation feature figures out and prints answers to mathematical equations inside a

portant and unique capabilities

are a number of seemingly arbi-

trary deviations from PC BA-

SIC. Besides removing the re-

quirement to use the LET

keyword, Version 2 provides

text environment. The word processing mode is transparent to communications activities, which read numbers right off the word processor screen: you input the number in the upper-left-hand corner and drop into communications mode: Telewriter II then dials

the number via modem. Since it handles two documents at a time, Telewriter II can manage a phone list, similar to SideKick's dialer list, which can be kept handy for calls. The telecommunications half

of Telewriter II supports ASCII or binary downloads (Xmodem and Xmodem batch) and scripts nowerful enough to execute timed, unattended file transfers. Telewriter II's one failing is that the program has no com-

FACT Telewriter II

R&S Micro Services Inc 2500 39th Ave. NE

Minneapolis, MN 55421 (800) 328-6400 List Price: \$129 Requires; 192K RAM; 300-, 1,200-, or 2,400-bit-per-second

modem; DOS 2.0 or later. In Short: Communications program/word processor that has the better features of both Excellent choice for users who work with on-line services. Not copy protected.

CIRCLE 423 ON READER SERVICE CARD

monsense way to end itself. Instead of typing in something mnemonic to end a session (like "quit"), you use a load-file command; but, instead of entering a filename, you type DOS and the program ends

However, on all other counts, Telewriter II's creators have made the right choices.



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-Ad for QIC Research's PC expansion chassis.

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"An integrated circuit used in 16-bit microcomputers of the latest design passed certification tests recently in Shanghai. About the size of a soybean, the circuit includes 17,500 mos transistors, nearly 40,000 leadwire holes and a memory-control system.'

- China Reconstructs magazine, December 1986

#### Classified Intelligence

IBM PC COMPACTA-BLES 512K memory. dual floppy drives, graphics monitor. \$950. -Wheeler Dealer,

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quirer, December 28, 1986

ATNT 6300, 10 MEG w/acctg., word processor, spread sheet & OKI printer. Mita 111C copier. \$4,000. -Houston Chronicle,

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a demonstration or call.

Compatibility?

#### True BASIC (continued from page 50)

and date and time arithmetic, plus 8087 support. True BASIC also includes many APL-like matrix operations that process entire arrays with one command and dynamic redimensioning,

which lets you alter the size of | an array without destroying its contents.

Unusual for a compiler, an immediate mode lets you examine the contents of a variable. Also unusual is the lack of numeric variable types-you don't need to distinguish be-

tween integer, single, or double [ precision. Because of its syntax, pro-

grammers familiar with Microsoft's BASICs will probably have difficulty adapting to True BASIC. For example, LOAD is now OLD, INSTR is replaced by POS, NUM is used instead of

al, and we'll send you \$50 and a PC Magazine T-shirt, Send entries to Commaniqués, PC Magazine, One Park Avenue, New York, NY 10016. Winners this issue: Jay Goldstein (110 percent compatibility), Dan Poorman (PC compactible), Claude Airall

(happy drive), Len Harris (ATNT 6300), Z.J. Nileolic (6 Megahurtz), George Van Vooren (\$2.99 cloane), Tim Schaff (Slimeline chassis), Suzi Birz (license plate), Jerry Tremblay (2016ean chip), and Bill Lee (Soft Wear specialist).

VAL, and to delete a program file from disk you use UN-

SAVE. The list goes on. Professional developers will also balk at having to cough up an additional \$99 just to create a standalone .EXE program and \$300 on top of that for the right

PC MAGAZINE . MARCH31, 1987

# The SAS System

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The SAS System runs on the IBM PC XT and AT, IBM 2707000450x and compatible machines, Digital Equipment Corporation's VAX\* and MicroVAX II.\* Data Central Corporation's BCLEFSE\* MV series, and Prime Computer, Inc.'s 50 series. Not all products are available for all operating systems.

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# **VAROOOO**

#### ONLY ORCHID GIVES YOU SO MANY WAYS TO TURBOCHARGE PC ENGINES.

Sooner or later, your PC will run out of gas. Even XTs and ATs can't make the grade with today's powerdraining applications. Like complex spreadsheets, CAD, color graphics, account postings and large data hases.

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Tinyfurbo 286	PCturbo 286e-12	386	
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Reploces 8068	Caprocessor	Rapioces 80296	
8 AH12 80286	12 MHz 80286	16 MH2 80386	
SK Coche	1 or 2 MB EMS	64 K Codhe	
	3 x XT Regioces 8068 8 AH12 80286 8K	266 286e-12 PC_XT PC_XT_AT  3×XT 8×XT  Replicors 6068 Caprocessor 8068 12/MHz 80286 80286 81 10/2 MB	

## INSIST ON COMPATIBILITY ACROSS THE BOARD.

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Tiryflurho 286 gives you a high level of compatibility that lets you run software like Lotus and Windows at AT speed with EGA graphics, EMS memory, or networking cards. You can even go back to your PCS regular 8088 chip, which remains in the system, giving you 100% hardware compatibility.

#### ADD AWESOME PERFORMANCE: PCturbo 286e:

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for developers and systems integrators. Through its advanced design, it lets you build minicomputer-like performance into standard PCs. With features like an optional Do MHz 80287 math chip, and coprocessing software for concurrent foreground/ background tasks.

#### MOVE YOUR AT UP TO 386 HORSEPOWER NOW: Jet 386.

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More importantly, Jet 386 uses the next generation technology, the 80386 microprocessor. So you can run all of the current software for the AT now, and all the new 386 software. By adding a Jet 386 to your AT today, you can extend the life of your investment well into the future. For a fraction of the cost.



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CIRCLE 306 ON READER SERVICE CARD light to 20x PCInto 20x and let 20x an assimulate of Octob biology A1 other pa some an instancial of their mendatures:

# DOOOMN



# The inventors of the 3.5" drive recommend only one floppy disk. Theirs.





If your computer has 3.5" drives, it has a little bit of Sony. Because Sony invented the 3.5" drive technology that has taken floppy disk memory all the way to two medabytes.

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SONY.

Committee One Open Committee One Open Committee One Open Committee Open Committee

#### ■ PC UPDATE ■ PEGGY GAVAN

IBM Corp. is distributing a new patch to correct a bug in the DOS 3.2 patch disk issued in November. The original patich, which included an amended DISKCOPY COM, did not allow users to copy an entire 3½-inch disk to another 3½-inch disk. Customers can receive the new patch from their IBM dealers or their direct-sales rep-

Microsoft Corp. has released a new version of its Multiplan that builds in support for local area networks. Mirrosoft Multiplan, Version 3.0, has several networking enhancements, including password protection, toda encryption, and implicit file locking, in addition, users can now view up to eight spreadsbeets on the series and too one time and link several spreadsbeets into a single sheet. Multiplain is priced at \$195; upgrades are \$50 for registered users. Microsoft Corp., Bellever, Washa, (2000) 426-4400.

Xerox Corp.'s Ventura Publisher desktop publishing software is now compatible with Moniterm Corp.'s Ylkling I publishing subsystem. The monitor's 1,280 by 960 resolution increases Publisher's control function speed and gives it WYSIWYG performance. This publisher coss S895. Moniterm Corp., Minnetonka, Minn.; (612) 935-4151.

The Samet Software System, Version 3.1, features a "network endy" capability that allows the program to be used as either a standalon or multiuser package, In addition to a single-user mode. Version 3.1 has full multisue; features, including file and record tocking in The Smart Data Base Manager. file locking in The Smart Oraphics, and password protection. The Smart Software System, which includes all three modules and LAN access for one workstation, has a retail price of \$985. Additional workstations costs to control to the state of the state of the state of the state of costs modules are proved at \$965. 940, and \$396, respectively. Registered users should contact innovative Software at (80f) GET-SOMAGT or (71) 927-800 for upgrad and additional pricing in-

Tecmar has upgraded the software accompanying its QIC-60 line of cartridge tape systems, giving them compatibility with Version 2.0A of Novell's NetWare LAN operating system. All QIC-60 subsystems are now being shipped with Version 3.28 of the software; current owners can pure





The Ventura Publisher is now compatible with Moniterm's Viking I publishing subsystem, giving it enhanced control function speed and WYSIWYG performance.

R-base System V, Rekease 1.1, includes a direct interface to Louss Development Corp. 3 fet Application Connection (T-4-C), which allows users to transfer data between mainframe and microcomputor databases. In addition, Release 1.1 enables users to export and import #BASE. Iff and #BASE III Plan files. Upgrades to the S700 Rase System V are free to users No postured the Microtim Softfor other registered users. Microtrim, Redmond, Wash.; (206) 885-2000.

Tallgrass Technologies Corp. has reduced prices on its internal and external tape has thug units by up to 45 percent. New prices for the 20- and 40-megabyte internal units are \$49% and \$795, respectively, and prices of sexternal units with up to 60 megabytes range from \$795 to \$1,695. Prices were also slashed on the external units with up to 60 megabytes range from many than disks. ranging from \$2,895 for a unit with a 25-megabyte hard disk to \$4,995 for one with an 80-megabyte disk. Tallgrass Technologies Corp., Overland Park, Kanse; (1913) 495-2006.

In brief: MicroPro International Corp. is bundling Microlytics' \$79 Word Finder thesaurus with WardStar 2000 and WordStar 2000 Plus until April 30. MicroPro International Corp., San Rafael, Calif.; (415) 499-7676... KeepTrack Plus, Version 1.2, has an automatic file-restoring feature and file-management capabilities, KeepTrack Plus lists for \$79; upgrades are \$12.50 for registered users. The Finot Group, Palo Alto, Calif.; (415) 322-6161...Racal-Vadic has cut prices on several of its standalone and internal Maxwell modems by up to 33 percent. New prices range from \$195 for the 1200PC internal unit to \$295 for the new 1200VP standalone modem. Racal-Vadic, Milipitas, Calif.; (800) 482-3427...Intuit has removed copy protection from its Quicken financial software and reduced its price by \$50, to \$49. Intuit, Palo Alto, Calif.; (415) 322-0573... Productivity Software International cut the price of its PRD Plus keyboard/macro enhancement program to \$68, a reduction of \$127. Productivity Software International, New York, N.Y.; (212) 967-8666...Best Programs has reduced the prices of PC/TaxCut, PC/Professional Finance Program, and PC/Personal Investor to \$95 each, a reduction of up to 61 percent. Best Programs, Arlington, Va.; (R00) 368-2405... BPI Systems has slashed the prices of its Entry Series line of accounting modules. All nine modules, which previously ranged in cost from \$595 to \$795, now cost \$295. BPI Systems, Austin, Tex.; (512) 328-5400.

# dBASE Users:

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"FoxBASE+ is the fastest and easiest-to-use dBASE product on the market." —George Goley, Data Based Advisor, November, 1986.

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# SHAREWARE, CONTINUED



Success in the growing shareware market can catapult a product into full retail prominence. But widespread confusion remains over what qualifies as shareware.

How do you differentiate shareware from public-domain software?
Most people, after all, don't. First, consider the source: shareware authors are often visionaries or zealots who use the low price and instant distribution as a way of promulgating their ideas.

of promulgating their sleas.

In my last column I pointed out that shareware has enjoyed a resurgence of popularity. I talked about their programs and the reasons why they were in the shareware areas. Shareware, I concluded, as a gentler market in which budding soft-hose their product, and just maybe hit the big time without owing their souls to any-one cles.

Computer bulletin boards and user groups are the backbone of shareware's distribution channel, which at once is six great strength and biggest problem. On the strength side, user groups and bulletin boards are far and away the fastest more revisions. The author just uploads the code to a bulletin board or gives a disk to the user group's disk thoration. If the program user group's disk thoration are group's disk thoration. If the program is the properties of the program of the prog

For the author, feedback is instantaneous. Users everywhere leave electronicmail via the same bulletin boards over which the software was distributed. On the downside, the percentage of shareware users who pay for what they use is appallingly low. PUBLIC-DOMAIN DIFFERENCE
Public-domain software is most often distributed with source code or in source code
form. Users are invited to play with it,
modify it, add their names to the "credits," and otherwise use it in uncontrolled
and unspecified ways. Public-domain software usually carries authorship information but not a copyright notice. It does not
typically ask for a fee or contribution in exchange for its user.

Shareware, on the other hand, is sedom distributed with source code (although FC-Talk III is a notable exception.) Users are not encouraged to modify it. It has both a copyright notice and a price tagined to the control of the control of the The more-significant products of fire princied occumentation separately. If you use the product, you are asked to pay for it. I feel that this is as much a legal obligation as a moral commitment. An agreement, after all, is an agreement, and by using a shareware program regularly, you are af-



firming its worth. The terms and conditions of using shareware are no differing those of any other commercial product. Only the distribution channel changes. It's just that you can get it on a free-trial or minimal-cost basis. The low cost of distributing software via shareware (mostly long-distance charges) is a major factor in keeping the price low.

With costs as low as they are, it's difficult to understand why many dedicated users are reluctant to ante up. Perhaps they think that because the cost is so low, the author won't miss a \$35 check. Or maybe that same low price causes writing the check to sink lower on the user's priority list. In any event, individual users are far less likely than corporate users to pay for shareware.

Recognizing this, some groups have institutionalized the purchase of shareware. After all, not everyone has a modem or chooses to take the time to find the latest version of a product and download it. So commercial and noncommercial entities have sprung up to simplify, organize, or commercialize the distribution of

shareware. PC-Blue, a joint venture between New York and New Jersey user groups, is probably the largest such or ganization. To date, it has issued hundreds of disks combining public-domain and shareware programs. PC-Blue is the distribution channel through which many user groups receive disks for internal distribution. The catalogs, ing of the software is an enormous consumers an incredible amount of coordinator Hank Kee's personal time.

#### ■ FROM THE EDITOR'S SCREEN

(Kee received a PC Magazine Award for Technical Excellence in 1985 for his efforts on behalf of users everywhere.) PC-Blue's disks cost only \$6 each, despite the contents. That covers distribution and cat-

or aloging, not registration of shareware prof-grams that may be on the disks.

At a somewhat higher profile than PC-Blue is PC-SIG. This group patrols the nation's bulletin boards agressively, always

on the lookout for new programs. It then reviews, organizes, and catalogs them. While PC-SIG advertises in big publications such as PC Magazine, the company's

ads don't do much to advance the image of the shareware market. The group's founders refer to themselves as "the Robin Hood of software publishers." If they are giving to the poor, who are the rich that

giving to the poor, who a they're stealing from?

They also cloud the issue of price, registration, and licensing by calling shareware "user-supported programs" and offering technical support in the same ad. Regarding price, the same sentence states parenthetically: "where authors ask that you send a donation. "It makes shareware authors sound like chair-

makes shareware authors sound like charity cases. You could also get the impression that the \$6 per disk charge buys the software on it. It doesn't.

Aside from all my beefs about its ad.

PC-SIG's culling process and willingness to answer the telephone to discuss these products is refreshing and valuable. Shareware has its commercial side, too.

Successful programs such as PC-File and PC-Write have long been advertised in the major magazines, as well as by word of mouth. Such high-intensity exposure helps the products and gains them even more widespread acceptance.

Shareware can be virtually indistinguishable from a fully commercial product, too. Brown Bag Software's product line, for example, includes shareware such as PC-Outline. The Brown Bag Word Processor is shareware that has been modified somewhat It started life as PC-Write and gained, to its credit, a new user interface and a spelling checker. Other Brown Bag products, such as Homebase, were never shareware. You can buy the products at the retail price from Brown Bag, with a monev-back guarantee and 7-day-a-week technical support. Or you can try the shareware programs through the usual channels before you buy. Such support costs more, so the price goes up accordingly.

Shareware isn't a panacea. A product in the shareware market is no more likely to make it big than an equivalent product in the retail market. Quality makes the difference. But the shareware market gives both the author and the adventurous user a chance to spread their wines.



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# THREE KEYS TO GOOD SERVICE



Taking their cue from George Burns, a lot of software companies have learned that the best way to support their products can also be the cheapest way.

In Search of Excellence counter Tom Peters likes to mona and groun about how American corporations have lost sight of the three most important things about running a business: the customer, product quality, and, especially, service. His favorine gimmick is to go into a company and fish through the in-baskes to collect memos. Then he raves about how none of the correspondence ever mentions the customer, the product quality, or service.

Cynical critics and social observers pick up on this and in unison point the accusative finger at our lovable tycoons and corporate moguls. I have to agree as I've given the finger to a few of these characters myself.

Take IBM (please?). It's one of the world's most successful companies and "is's known more for its service than it is for anything else, except, perhaps, sales. Fact is service set Isa. And in the microcomputer business, there isn't much service to speak. Of Worse, the laster than is to charge extra for service that should be free. It's kind office saying, "It'erse's our product. It's ou want it to work, then you have to pay more!"

SINCERELY FAKING IT Sure, service is expensive and microcomputer stuff is cheap. What to do? What to do? As I pondered this question the other day, I recalled a George Burns quote. According to a nearby patron at an exclusive Los Angeles eatery, Burns was stifing at a table explaining the secret to good acting. He said, "The key to good acting is simble—sin-

cerity and honesty." He then paused and said, "If you can fake that—you've got it made!"

Perhaps faking service may be as effective as the real thing. In this day and age, image is everything. I'm convinced that a lot of software firms are employing "faking it" techniques already. Here are the three most important techniques:

TALK IS CHEAP Remember that, indeed, talk is cheap. The successful software company will mouth off a lot about
what a wonderful "service-oriented"
company is i. The motto of the successful
chief executive officer should be: "Service
is our number-one priority." This is always a cheap way to impress the public
without ever having to do any real work.

KEEP THEM WAITING, FOREVER You should have no more than one phone line into the company for every \$5 million



in sales. The special service department lines must always go through a rotary system hooked to an answering machine that

says. "All our lines are busy at the moment. Please stay on the line for the next available service technician." This gives the customer the impression that you're busy (therefore successful). The system should be set up so that there is always a 10-minute delay. You hope that most customers will give up before the 10 minutes are over and hang up.

Note: there will eventually be a public usery over the impossibility of actually talking to someone. That's when the company CEO comes out and says, "We're very aware of this problem. We have ordered new phone lines and hirden new service representatives. This problem stems from the fact that we are one of the few software companies who gives unlimited free support to software developers who use our products." Of course, no changes are made.

MAKE THEM CALL AGAIN Suppose some funate is say on the line unit some former is say on the line unit some vice representative answers. What do you do then? First, at for the service representives should speak only. Pidgin English. Whatever the question, they should, with "That an engineering problem. You hold, urnsfer call." Then they should immediately hang up. People always assume that telephone systems are unable to transfer calls half the time, so the hang-up will be an expected "mistake."

Do any of these techniques sound fa-



## Q-DOSII is the only REAL hard-disk solution!

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an on-line manual." - InfoWorld
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-	YEST	1780		-	-57

## Here's a sampling of what Q-DOS II can do for you: Instantly copy, rename, erase, move or change

- Instantly copy, rename, erase, move or change file attributes on one or several files!
- · Create and edit files with the zippiest little editor
  - you'll ever see!
- Provides faster ways to organize your disk, available only in Q-DOS lit
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- Many more features too numerous to mention!

Minimum System Requirements: IBM PC, XT, AT or compatible running MS-DOS 2.0 or higher, 256K RAM, 2 Disk Drives (Hard disk highly recommended).

These tests were performed on a standard IDS P clone (8088 processor, 4.7 Mhz), a 20 M8 Seag drive, 53 subdirectories, 1083 files.

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# INSIDE TRACK

Atari wows the rubes, Victor restates the obvious, and Ashton-Tate gets tough.

Once upon a time, there was a show called the Consumer Electronics Show. Once there was a mania for small computers, games, and books about computers. One day a man said, "Hey, there isn't any profit in this. And worse! The Japanese are coming! Lowballers are surrounding us!" The entire group went off, screaming, waving their arms in the air.

Now they're back, Las Vegas, 1987. This time it's a new mania. IBM PC clones. This charge is led, once again, by a company named Atari. This "new" Atari, though, is headed by the ex-Commodore mogul, Jack Tramiel, and his boys. I'm skeptical of the new Atari PC clone. In the past, Jack had a tendency to do a lot of what is called "dry testing." Dry testing is a perfectly legal way to test the waters for new products. The technique is much used in direct-mail marketing. It works like this: First you start with what you think is a good idea for a product. So without much to show other than a prototype (or a drawing), you announce it and study the reaction. If you're swamped with orders, then you manufacture and sell; otherwise you forget it and give people their money back.

When Tramiel ran Commodore, he dry-tested a couple of 8088-based machines and other products that were never made.

Evidence of Atari dry testing includes an excess of discrepant information. The day before the press conference I was told one thing. Earlier, a cohort was leaked different information. The press conference told a different story. The Atari-run BES Inda another. Affiremat story, and personnel in the booth were saying something else again. This, to me, earmarks price-and-feature dry test-

ing, although it's an unusual way to do it. In direct marketing and mail order, it's not uncommon to test-sell an item with various prices and features to find the magic combination.

Alari made mage with two of its amnouncements. One was about a complete desktop publishing system with laser printer for \$2.995. The other was the judicrous assertion that the Atari FC with a disk drive, monitor, and EGA output will self for \$395. Apparently, someone at the booth was promoting this price as the "real" system price. A woman who should know better was in the press room leiling everyone how Atari was going to both the proper of the water with his pathetic display of naiveté by professional journalists.

The most detailed flyer handed out by the company indicates that it will she to company indicates that it will she to come in April 1987 that will have one of the company indicates that will have one of the company indicates the company indicates the she will be she wil

One peculiarity about many of the new clones (that makes me wonder what these people have on their minds) is that these people have on their minds) is that some of the new machines, unlike the Atari, do not use the high-speed 8-MHz 8088. Life is too short to continue using the old 4.77-MHz 8088. So what does Commodore show for a Pc Clone? A 4.77-MHz muschine that cayds about a grand. Victor was showing its Victor Champion. It too has a 4.77-MHz chip. At least the price is a reasonable Sri a rea

I was amused by the Victor brochure.

Obviously written by copywriters who don't know a computer from an electric back scratcher, it said suff like "Built-in Disk Drive. Extremely handy, right where you need it." Huh? As opposed to what? Putting it in a warehouse in Jersey? "Honey, can you drive this disk drive to Ersey? Be sure you close

Recommended CompuServe Forum: the Consumer Electronics Forum (go, CEFORUM). While I was in Las Vegas, I was amused by reading various engineers complain about such things as how they had to tweak master recordings for CD releases because some executive complained they would somehow sound

the latch, too. Not like last time!

"digital" if put on a CD. Good forum. What the Heek Kooligo (Dept.). If guard the late great George Tate was turning over in his grave when Asthomating over the grave when Asthomating over the grave when Asthomating over the Grave of Secret technology." This seems like weared works for "fet took his ideas and spill." Radiff quit the company to work cleaves. This remains for of Apple and the grave of the



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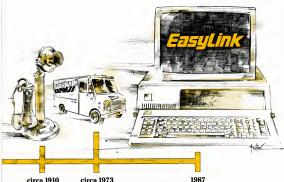
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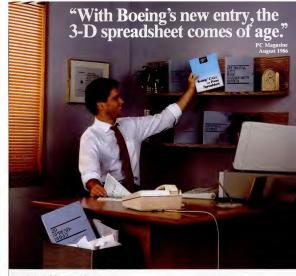
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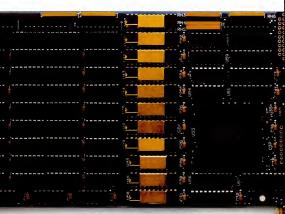
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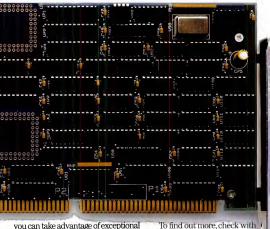
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# More Floating-POINT FORMATS



In the second part of this series, Norton explains overflow errors and a trick that some programs, including 1-2-3, use to increase calculation accuracy.

In last issue's column we began a discussion of floating-point numbers, the data format that allows our PCs to work with numbers in a wide dynamic range of values.

Floating-point numbers can take on many different forms, and the exact form affects the limits of how accurate our affects the limits of how accurate our caudiations can be. The two most important things to know about a floating-point for inter brinary or decimal digits of precision and what its dynamic range is (how almost markers) it can deal with any. Much the unimbers it can deal with any. Much the unimber has used, 2 or If Our whites it was the sumber has used, 2 or If Our whites it was the sumber has used, 2 or If Our whites it was the sumber has used, 2 or If Our whites it was the sumber has used, 2 or If Our whites it was the sumber has used, 2 or If Our whites it was the sumber has used, 2 or If Our whites it was the sumber has used, 2 or If Our whites I was the sumber has used, 2 or If Our whites I was the sum of the sumber has used, 2 or If Our whites I was the sum of the sumber has used, 2 or If Our whites I was the sum of Our whites I was the sum of Our whites I was the sum of t

Years ago I saw a program—written in FORTRAN for mainframe computers—that would calculate two of those three things: the number of digits and the number base (it also figured whether calculations involved rounding or not). In my last column I showed that program translated into PC BASIC and I discussed how it could be adapted to test a spreadsheet's number format.

The program tested how the floating-

The program tested how the floatingpoint aclustations were done by a soft of gentle probing method. "Gentle" in the sense that the test doesn't cause anytonia strange to happen. The program did not, however, test the dynamic range of the floating-point numbers, because to do that requires finding numbers too big or too small for the floating-point format to handde. Depending on the computer and handware being used, that might be disruptive (for example, abott the program). The program I borrowed was designed to avoid that risk, showing what could be learned about floating point under any circumstances. But if you're willing to live dangerously, you can find out.

When floating point becomes too large it's called overflow; too small is called underflow. Some computer designs will kill a program when either happens. In PC BA-SIC, overflow triggers an error, and underflow is ignored. You can demonstrate that and learn how big BASIC's dynamic range is (expressed in terms of the power of 2, BASIC's floating-point base) with the programs in Figures 1 and 2.

Those two tests show us that BASIC's floating-point format goes up to as large as 2 to the 128th power (about 10 to the 38th, which even these days is still larger than the national debt) and down to the inverse of that, I over 2 to the 128th.

(If you ran the two test programs, you got something close to that result but not



quite so neally symmetrical. In one direction it went to the 120th power, in the the 127th power. That's because our starting point was one, 10, the actual "mile point" so no. 10, the actual "mile point" so for BASIC's binary floating-point format is ½, or in binary postation 0, 1. One of the nifty things about performing little experiments like the one were doing is that you encounter little curiosities and, with some thinking, figure out what they mean.)

BIASED CALCULATIONS This floating-ing format, like every net for lawuever seen, evenly divides its range—it will handle large. Most calculations, and particularly financial calculations, don't come
anywhere near the limits of this dynamic range; that, of course, is just what we want. But for some scientific purposes, the might worder if we could get away with biasing things—shortchanging one end of the range to get more action on the format for the country of the country of the country of the end. Allowing much bigger numbers by gipnoring the smaller ones or vice werea.

It certainly could be done, but as it turns out, that wouldn't work out very well. If you're doing calculations among numbers of a certain size, it's fisled but at a some intermediate point in the arithmetic you're dividing by a big number and so have to be able to handle numbers as small as the invenes of the largest number you're using. That, in fact, is why these floating-point formats have a dynamic range that is symmetrical between the very large and the very small.

#### ■ PETER NORTON

One of the things that our program in last issue's column was able to figure out for us was the number base that's used for the floating-point calculations. My tests showed that BASIC and 1-2-3 use a binary

base (which is very normal) while Framework II uses the base 10. IBM's mainframe computers, incidentally, work in the base 16. hexadecimal.

You'd think that the number base that's

used would have no practical impact on the results of our calculations. In the big picture that's true—one base works as accurately as another. But when we closely examine the edges, it turns out that there are subtle differences between one number

base and another.

One difference, as I mentioned last time, is that if the computer uses number base 10, as Framework II does, then it can give us results that from our viewpoint are more accurate than base 2 could provide. In base 10, floating point can represent one cent, 0.1, exactly, while binary can only approximate it. Systems like BASIC and 1-2-3 are clever about minimizing (in effect, disguising) their inherent inaccuracy

```
18 FOWER = 8 : X = 1

28 FOWER = FOWER + 1

38 X = X * 2

48 PRINT FOWER

58 IF FOWER < 129 THEN GOTO 28
```

Figure 1: A program to derive the upper limit of BASIC's floating-point format.

```
20 POWER = POWER + 1
30 X = X / 2
40 IP X > 0 THEN GOTO 20
50 PRINT POWER
```

10 DOWER - 0 - Y - 1

Figure 2: A program to derive the lower limit of BASIC's floating-point format.

with decimal fractions, but at times the problem will rear its head. Not, however, with systems that use base 10 for floating

There are, though, some very big advantages in using 2 for a floating-point base. The really obvious one is that since the computer's basic skills are linked with binary operations, base-2 floating-point cacluations can be much faster. There are also other, more-subtle advantages to us-

ing base 2.

Except when we're lucky enough to be working with round numbers, floating-point calculations are inherently inspecies. The question is, what's the exact nature of that imprecision? If you think about how floating point works, you'll see that the smaller the number base, the more evenly imprecision is spread around and the less choppy are the inaccuracies of any calculations. And of course, 2 is the small-



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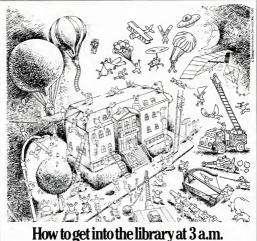
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## PETER NORTON

est base we can use in our calculations.

Further, though I'm not an expert in these things, I believe that the formulas used to calculate built-in functions like LOG and TAN are simpler, faster, and more precise at the edges for base-2 calculations than for base 10. (Experts in numerical analysis please write in to let me know if my thinking is right.)

I mentioned before that IBM's mainframe computers happen to use base 16 for their floating point. It's a curious format. unique I think to them. Since base 16 is a relative of base 2, calculations work just as fast. Base 16, like decimal base 10, suffers from a less uniform, choppy imprecision. So why did IBM choose to use such an unusual base? Well, according to an informal analysis that I did (which is too convoluted to explain here), the mechanics of base 16 incorporate a trick that in effect gains more than a full bit of extra precision, on the average. And that brings us to one last trick, a

trick that has been incomorated into most base-2 floating-point formats. The value of a floating-point number is always stored with any leading zeros shifted off-so that a number like .0001234 is stored as 1234 (combined with an indication of where the decimal point is).

That means that the first digit of a floating-point number is never zero. If we're using any base other than 2, that doesn't tell us much. But with base 2, if the first digit isn't zero, it must be one. And since that's the case, we don't even need to record it as a bit-we can save that space to give us another bit of precision on the far right-hand end of the number. That allows base-2 floating-point numbers to work with one digit more precision than they actually have room to store.

We actually saw this in action in our last column when we tested Lotus's floatingpoint format. You'll recall that our test program checked out Lotus numbers and found that they calculated with 53 bits of precision. But when I looked up the format in Lotus's data format manual, it showed that only 52 bits are stored. The extra bit of precision came from using the trick of implying the first 1-bit at the beginning of each number. This trick is nothing unique to Lotus-it's an industry standard and a clever one to boot.



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what we wanted. avoid. When we processors that met a very short list."

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# WHITHER LOTUS?



No longer content to be a "one-hit company," Lotus has positioned itself to assume its rightful share in the software leadership of the next technological era.

Whither Lotus?
That's been heard with in-

verasing frequency over the past year or so, especially in the months since Mitch Kapor's departure. You can't live off the profits from one big hit forever, goes the chorus, and good as 1-2-3 is, its day is going to pass. What then? Though Lotus people like to claim it's

Though Louis people like to claim it's be public perception. If Louis says, Symphony were would be the fifth-largest personal computer software firm. Yet few would can be fifth-largest personal computer software firm. Yet few would can be represented to the property of the property of

But over the past year and a half, Lotus has undergone a dramatic if not very visible change. While 1-2-3 continues its dominance of the spreadsheet market, Lotus has been using the phenomenal revenue stream thrown off by that flagship product to fundamentally change the company.

After a buying spree that brought the people and products of Graphic Communications (Freelance), Isys, GNP (HAL), Software Arts (Spotlight), and others into the fold, Louts has begun to integrate those tools into larger, synergistic systems and to start to sell back into the 1-2-3 user base and mystique.

With new and skilled management in

place—and a depth of management talent inconceivable at Lotus 2 or 3 years ago—the company is finally in a position to leverage off that 1-23 success and installed base. That this ought to have taken place long ago is less interesting than the present reality that such first-rate managers as Michael Kolworich and Dan McMillan are finally in place, running Lotus's main-stream business.

No one I know, including people in Low trus management, expects to see another 1-23-site success, from Lotus or anyone lefe for that matter. The software industry is way past the hit syndrome, although some Wall Street analysts and computer more wall for the success of the computer to the computer of the computer of the lock for The Next Big One, Instead, and despite some continuing growing about whether it can find the inspiration for any more great products. Lotus appears to be focusing on the kind of product groups that are likely to be the hallmank of successful



software companies in the next decade.

Only one other company is able to take that long view and to bring to critical mass the capital, long-haul product-development management and programming talent necessary to transcend today's limited, single-user, productivity-software focus: Microsoft.

MICROSOFTS-JOB EASER In trust, Microsoft's job is a let easier. With substantial control over the direction and pace of subsequent releases of DOS, which the cash flow from DOS licenses, and with very good to exceptional applications programs for both the Macintosh and the Portivoments, Microsoft has more control over it redestiny—indeed, more control over the destinies of all of us who not and rely upon PCs—shan does Lotus. Or any other vendor.

Lotus, to paraphrase John Houseman for Smith Barney, will have to craft its future the old-fashioned way: it will have to earn it.

Apart from a clearer vision of its future, and new and better management, Lotus has a couple of other strengths, but faces a couple of very rocky shoals.

The company's extraordinary entrole into corporate America is surely its biggest asset, more important in the long run than even 1-2-3's phenomenal success—from which, of course, that entriée grows. It has been a foolish and petulant exercise over the past 2 years for Lotus to anger its corporate customer base and put that entrée at risk, through ever-poorre telephone support, overpriecte upgrades, and the addi-

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#### ■ JIM SEYMOUR

tional insult of copy protection.

Lotus's answer, the so-called Multi-Value Plan, is seen by many corporate people as less a response to their demands than an effort to appear to be responsive, while continuing to stonewall. If customers seem to need help, seem to help them.

Yet behind that arful dodge, Lotus has been adapting to the reality of the present market: it's gone virtually unnoticed, but today only 2 of almost 20 Lotus software products are copy protected. Freelance Plus, HAL, Manuscript, Measure, and most recently Express have all come to market without copy protection; only 1-2-3 and Symphony remain infected.

Lotus's second great asset is raw programming talent. With the departure of Mitch Kapor, arguably the best softwaredevelopment manager in the business, Lotus has less charismatic leadership of the R&D function that it would like, and than many of its best programmers would like. Dear a company that has a fort Sachia developing Eugress, and R&D VF EB Below caving out a cisp, baid vision of the next generation of applications software isn't siy in the R&D department.

On the negative side, Lotus has to keep that eash cow 1-23 chauging away to provide a bridge to Belove's vision. The company may deny being worried about the successes of VP-Planner and possibly the new \$20 spreadsheet from Ontio, about Javelin's nascent turnaround, and other assaults on Fortress 1-2-3, but whistling past the graveyard is a risky business.

Ås clever as HAL is, it should have been a part of 1-2-3, Release 2. That's the kind of leadership that made and can sustain a Lotus; tapping your customers \$150 to move up to Release 2, then another \$150 for the interface-fixes tool kit that should have been a part of that release, does not happy customers make.

Nor does it keep the cash cow generating the dough that gets Lotus into the 32bit world.

THE 32-BIT CHALLENGE Because, finally, the challenges of the world of 32-bit software are the biggest uncertainties in Lotus's future. The move over the next 5 years to new programs that fully exploit the speed and, more importantly, the

memory addressability of the 80386 chip offers the very real possibility of turning the software business upside down.

Just as the advent of the 8088 world 5 years ago reshaped the software business. making a Lotus possible, the intuitive leaps and programming genius that will create the 80386 world may well make that lightning strike for another firm. There is no reason to believe the leaders of the



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80386 software business will come only from today's best-known PC software firms.

Microsoft's position, as the godfather of the operating system that makes these leaps possible, is relatively secure. But no one should believe dominance in the 8088 applications world will automatically confer leadership in the 80386 world. Lotus has a shot-a good and well-financed shot, from a comfortable position-at that leadership. But not more.

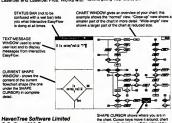
It is characteristic of both American business in general and the personal computer industry in particular to misapprehend opportunity as peril and to run for cover precisely at those times when boldness and self-confidence are required. Lotus's corporate culture works against that

 It is characteristic of both American business and the personal computer industry to misapprehend opportunity as peril.

disease, an attitude that is itself a substantial corporate asset.

Lotus has come much further than has generally been understood outside the company toward re-creating the corporation in anticipation of the next evolutionary phase of the software business.

If it takes those last steps-to erase the final problems in its relationship with customers, to learn to manage development of programs with a couple of mega-bytes of finished code as well as it has managed those with a tenth that much, and to shed the hesitancy and turf-defending posture that have characterized much of Lotus's nublic behavior over the nast 2 years—the company can complete its transformation from a new kind of software company for the eighties into a better kind of software company for the nineties. My bet is that it will.



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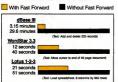
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# THE LOST CHAPLIN ARCHIVE



A look at some of the Little Tramp's hitherto-unknown film shorts suggests that IBM's relationship with the comic genius may be more far-reaching than anyone realized.

milm lovers are sure to rejoice over the cinema's latest surprise discovery. In a forgotten, cobweb-shrouded vault in an Armonk, New York, basement warehouse, two clerks recently stumbled upon a treasure trove of hitherto-unknown two-reel silent short subjects directed by and starring the sublime Charles Chaplin.

Dating from the period when the comduin's statents were at their fullest, this find has been acclaimed as the greatest gain to film comedy since the discovery of seven lost Three Stooges vehicles at Gavilian Computer headquarters. Although the films will not be released publicly until retoration has been completed (with the help of a major grant from IBM), PC Magazine was able to folkalian an occlusive previous was able to folkalian an occlusive previous was able to folkalian an occlusive previous be able to expect soon when The Chaptin Folkes appears no your local screen.

The Thinking Muchine in Servers.

The Thinking Muchine in Servers in The Thinking Muchine in The Thinking Muchine in The Thinking Muchine in The Thinking I server in the List to Tamp invents a radinentary thinking machine with a Ouijs board as the primary input and output device. The hulking Muck Swain buys dozens and improves on them with goat glands, an outboard motor, a automatic transmission, a ticker tape, and dozens of other features. Charlie and Muck both become rich, but the girl spurns Mack instead. At fade-out, the thinking machine tells Charlie. "If only you'd asked me . ." Charlie gives it a swift kick in the Ouija.

The Tramp, Jr. In this clever story, originally intended for Christmas release, Charlie the hashhouse owner charitably takes in a delinquent founditing and dresses him up in a mustache and a little Tramp outfit. Chartie figures the kid can fill in for him as chief cook and bottle washer, leaving him time to court the lovely June to the lovel of the lovel June ends up literally with egg on her face the film fades out with good-for-nothing Junior lounging around in the back room counting lovely Julie (June's younger sister), while Charlie stays out from ching all stay lovel of the lovel of the lovel of the lovel for shifting the fille is kit.

At the Boardwolk. This comedy of errors at Coney Island divides neatly into two parts. First Charlie opens an ice cream stand that sells only one flavor—pistacitio—and tries to charge the unheard-of price of 50 cents per cone. What Charlie does with his unsold mound of rapidly melting ice cream has to be seen to be believed!



Then Charlie changes his luck by devising a high-speed carousel. The beautiful, fast machine attracts dozens of customers but soon develops a minor flaw: for no apparent reason, it keeps crashing to a halt and making riders disappear.

Portly detective Eric Campbell is as baffled as Charlie about the crashes and disappearances, but the final scene provides the missing link. The vanished customers reappear at the bottom of a greased chute, where a familiar-looking mustachiood devil welcomes them in and offers them pistachio ice cream cones for 50

The Impresario. Indefatigable Charlie presents a piano concert featuring the great but inscible virtuoso Sergei Sockmaninoff. Unfortunately, the little impresario forgets to mention that the recital is intended to advertise his own newly improved piano—the one with the all-new keyboard.

When the saxophonelike setup fails to tickle the ivory-tickler's fancy. Charlie produces a second piano with the black keys where the white ones should be and vice versa. From then on the fun is nonstop as the artiste ends up sending six more "improved" keyboards flying—along with Charlie himself.

Complaint Department. Complaint department manager Charlie spends a full working day trying to fix the balky telephone. Between the wires tangled around his neck, the fumb-seeking harmer, and the sparks flying from the walls, he can't seem to make it work. At last he succeeds, just in time for the big comedy payoff: ex-

#### ■ STEPHEN MANES

hausted, the Little Tramp lies down for a nap, refuses to answer the insistent rings. and finally takes the phone off the hook. In a surrealistic gag far ahead of its time, an angry hand comes out of the phone to do a

little wringing of its own-Charlie's neck. The Entomologist. Visiting the city

zoo, Charlie accidentally uncages the terrible 6-foot-long poisonous insect known as the "tyrannosaurus cockroachus." As

nanic ensues throughout the city. Charlie takes it upon himself to capture the bug and bring it back to safety. Alas, Charlie falls on the rare insect and kills it; the scene at the graveyard where he gives it a decent burial is destined to go down as one of the landmarks of screen comedy. At fade-out, the town is still in an uproar behind him. since Charlie has neglected to let anybody know what he's done. His puzzled headscratching as he walks away from the chaotic scene adds a note of ironic charm.

The Plumber's Apprentice. Charlie is an apprentice plumber in a high-rise building. Mack Swain, his brutish boss, gives him a series of chores, and Charlie handles them with great creativity.

Just wait till you see how he unclogs the wealthy matron's pipes!

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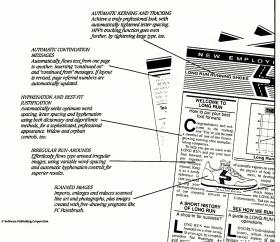
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# WHO BUYS PC PRODUCTS FOR COMPANIES?



The corporate technical guru may be the decision maker everyone listens to, but it's a mistake to ignore the litle guy who works with the products.

ve been having a long-running argument with PC Magazine's publisher, William Lohse. It goes like this: I keep writing columns about what users want and/or need from the microcomputer industry and why the industry sometimes doesn't seem to understand users. Then I get a message from him that says something like, "You have this funny, outdated notion that users buy. They don't. You should be talking to the technical gurus, the people who understand computers and recommend their companies' purchases. Those users are going to keep turning to someone to help them, and the gurus who understand your message will be the ones they tum to."

STRANGE BREED You should understand, before I proceed, that magazine publishers are a funny breed, possibly even stranger than editors. The primary iob of publishers is to sell enough advertising that the magazine can afford to keep editors and columnists from starving or going to work for the competition. So publishers tend to worry a lot about whether their editors are writing articles that will get the right kind of readers, the kind that advertisers want to advertise to. Yes, I know it's a warped way of looking at the world, but someone has to do it. And this particular publisher wants to make sure that PC Magazine is read by the kind of people who recommend computer purchases for their companies. Brand specifiers, he calls them.

The funny thing is that Lohse is right. Any self-respecting company with reasonable fiscal and management controls has to somehow organize the purchase of its personal computer products to make sure that the PCs are being used to their best advantage and that there is some reasonable level of consistency in the purchases so that training and maintenance costs and compatibility issues don't overwhelm the company. Whether the company goes all the way to approved-product lists selected by committees or just institutes an informal coordination system between departments, the people who ultimately end up recommending the products that get approved and purchased are the ones who know something about personal computers and are trusted by the executive managers. And users, those people who generally have a different job to do and don't have time to keep up with the details of the personal computer business, don't seem to have much say about that process of recommending new products.



INDUSTRY OBSESSION Indeed, this whole process of how companies buy products has become something of an obsession for the personal computer industry. No industry conference is worthy unless it has the requisite panel to discuss the corporate buying process. The trade papers are dense with a variety of opinions about who's responsible for purchasing products. And most computer magazines now claim to serve the interests of the corporate buyer, who is variously referred to as a micro manager, a brand specifier, a PC coordinator, or just a plain old technical guru. The prevailing thinking among those who should know is that the user-that guy who's supposed to get the most benefit from all this stuff-is passé. All you have to worry about if you're designing products, thinking up marketing campaigns, or writing articles is the guru,

Āl best, this jonit of view is optimistic. At worst, it's pure clapture, It shows how completely the industry is being taken on view of the complete of the complete of the complete of the complete of the way data processing people reacted to personal computers when they exacted to personal computers when they and 1981. "More toys," in harmuphed the experts. Yet users—yes, those benighted people who really just want to do their jobs better—actually went out and spent their own money (or their department's furniture budget) on these new toys and some the complete of the

the guy who buys.

In my experience, users haven't gotten any dumber in the intervening years. No, they don't have time to mess around with

#### ■ STEWART ALSOP

new products all day in hope of finding a little gern that might save a few moments. And they don't have to know the specifications of every one of the 97 printers introduced in the last 12 months. But they do

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keep a weather eye on what's happening in the world of personal computers and they've developed an almost prehensile ability to spot a new product that could really help with their work.

This ability poses something of a probe infor the people who are formally responsible for recommending and appropriage their companies' purchases of computer products. Essentially, it puts them in the same position as the vendors, with the technology but that they have to be careful to remain very sensitive to their users' needs and serve those needs well strong between the control to remain very sensitive to their users' needs and serve those needs well strong between the control of the control



jobs in jeopardy in the same way that vendors find their market position fading when they lose touch with their customers.

THE PENDULUM SWINGS The conclusion I've come to is that, within large companies, there is a pendulumlike cycle between users and buyers. Buyers do recommend the specific purchases, but if they don't end up satisfying the users, they will be forced one way or another to change their recommendations or lose their position as buyers. So ultimately the users do control what their companies buy, only in an indirect fashion. And that's why both vendors and corporate buyers need to put the user first in their thinking, because no matter how hard the salespeople or the analysts try to change the situation, the customer is still and always will be king in the computer business. The progression is simple; the user is the buyer is the guru.

simple: the user is the buyer is the guru.

And so, Mr. Lohes, you're right. But
you can't be so right that we overlook the
end user. That's why I'm going to keep
writing columns about what that poor,
durnb user needs and wants and why in
industry should spend just a little more
time listening to the guy on the other end of
the technical-support line. So there.



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- the touch of a button.
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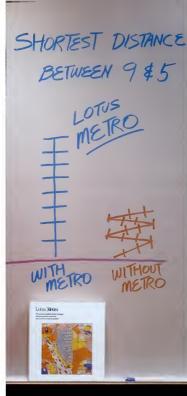
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opsom requirements.
3849 PC, XT, Petable, AZ, COMBNAP Renable, PLUS, DESAPRO Two
5.25° double-safed deal drives (hard data recommended for optimal
performance). Minimum of SNR required for RNA resident portion of
Meros DOS 2 Our higher. Meros is unprotected and can be removed from
memory.

Lotus Metro runs with a wate variey of software programs, including 1 2 1 <sup>th</sup> Symphony <sup>th</sup> Symphony Spelling Checket, Symphony Text Cutlin 1 2 1 Seport Writet<sup>th</sup> and Signal<sup>es</sup>





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tou get summing monocurouse grapuses and migni resolution text. How does that make your life easier? Simple. When you run a Lotus" spreadsheet, you can view up to 65% more data on the screen at one

view up to 65% more data on the screen at one time. All 12 months plus the totals column, in full 10 character columns! If you use Hercules or IBM adapters, you have

to pan to see that much data, wasting keystrokes and valuable time. But that's just the beginning. When you use Microsoft Windows' with the

Classifieur HT, you can display one application on the first two thirds of the screen, leaving the other one third for additional applications. That's how Windows was intended to work. Whether you want to get more inlease out of your Lutus or open more windows in monochrome graphics, only one video adapter goes the

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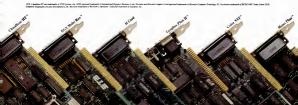
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• 1056 x 352 bit mapped resolution

• Almost 50% more than Hercules
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ACTUAL SCREEN showing all 12 months and the totals column of a Lotus spread sheet at one time. Note the sharpness of the 8 x 14 character cell produced by STB's Chauffeur HT.



# EGA AND MULTISCAN MONITORS

The color monitor market has expanded to include new standards—giving you a wider (and more confusing) range of products from which to choose. Read on for help in deciding if it's an EGA compatible or multiscan that will best display your text and eraphics.

Just a few years ago, there wasn't much choice in video monitors for the PC—you either bought monochrome, which could display high-resolution text but could not display graphics, or you bought an RGB color monitor and a color/graphics adapter, which could display color graphics but reduced the resolution and therefore reduced the legibility of text or numerical data. These were choices, but may more are confused. If

bility of text or numerical data. These were the standard displays for several years. Today your choice is still between

Today your choice is still between monochrome and color, but color monitors now fall into four categories: those monitors compatible with IBM's CGA (Color/Graphics Adapter), EGA (Enhanced Graphics Adapter), EGA (Enhanced Graphics Adapter), and PGC (Processional Graphics Controller), and multiscan monitors, which can run all three. Many users are elated by this variety of

choices, but many more are confused. If you're thinking of upgrading your old monitor or buying a completely new system, read on.

If you're in the market for a color monitor, it's important to understand the differences between the standards. The screen terms presented throughout the reviews will give you a detailed explanation of monitor specifications, but here are some basics on display standards. CGA moni-

# ■ EGA VS. MULTISCAN MONITORS

tors, such as the IBM Personal Computer Color Display, are compatible with IBM's Color/Graphics Adapter, which has a maximum resolution of 640 by 200. At this resolution, a CGA monitor can display four colors (red, green, blue, and black) simultaneously; at a resolution of 320 by 200, a CGA monitor can display up to 16 colors simultaneously, but the text display is limited to 40 columns instead of the 80 columns provided at the higher resolution. This might be acceptable for game and educational software, but users involved with word and data processing, desktop publishing, business charting, and other high-end applications demand higher resolution and more colors than the CGA standard was designed to yield.

Enter the EGA standard, pioneered by IBM's Enhanced Graphics Adapter and Enhanced Color Display, which were introduced in 1984. The combination surpasses the screen resolution of CGA to a maximum of 640 pixels by 350 lines, and

it can display 16 colors at one time. Text and data characters are formed in a matrix of 8 by 14 pixels for greater readability than that available on the CGA character matrix of 8 by 8.

For the most demanding users and raphics-intensive applications, even the EGA standard isn't enough. The next step up is the PGC Standard (for the Professional Graphics Controller), which was also pioneered by IBM and introduced at the same time as the EGA. The PGC can display 640 dots by 480 lines, yielding even higher resolution than the EGA, and can display a maximum of 256 colors simultaneously. IBM's PGC retails for about \$3,000 and the Professional Graphics Display for about \$1,300, which is far out of the range of most users. The PGC is used mainly for computer-aided design and high-end graphics packages. Moreover, the success of the EGA standard has cast somewhat of a shadow over the PGC, in

effect consigning it to oblivion (see sidebar

"PGC: The 'Standard' Time Forgot").

Finally, there is the new breed of multiple scanning monitors capable of being driven by Monochrome Display Adisper. COA, EGA, no PCO boards. These monicause unlike EGA monitors, which read only two horizonal scan rates, they accept a range of horizontal scan rates to provide compatibility with a wider range of graphiics display adapters. The NEC Multibyne, for example, can mead scan rates from 15.5 for example, can mead scan rates from 15.5 date the signal from most graphics boards you are likely to own or buy.

MULTISCAN MONITIORS If you want a monitor that takes advantage of a wide range of graphics standards, you'll be more interested in the multiscan displays than the EGA compatibles. You could buy a multiscan monitor and use it with all four standard graphics boards that IBM has produced, and perhaps some new ones it will

# EGA and Multiscan Monitors: Summary of Features

Though there's a \$700 difference between the cheapest EGA and the most expensive multiscar monitor, a large number of multiscan monitors come in at under \$900, making them only slightly more expensive than the average EGA, which retails for \$700 to

		Screes	CASE OI	MENSION	8 (inches)	L				INPU	rs			
Product	List	size (ding. in inches)	Height	Width	Depth	Catin length (loches)	Reso- lution (pixelo)	Band- width (MHz)	Det pitch (mm)	RGB	Com- posite	Sepa- rate syst	Analog	
EGA COMPATIBLES														
Cosper MC54	\$699	13.5	14	14.25	15	51.5	640x350	25	.31	•	0	0	0	
Compaq Color Meetter	\$799	13	12	14	15	61	640x350	18	.4	•	0	0	0	
19M Enhanced Color Display	\$849	13	11.25	15.25	16	43.75	640x350	16	.31	•	0	0	0	
Mittaubishi XC-1410C	\$549	13	12	13.9	15	82.S	640x350	20	.4	•	0	0	0	
Hense \$8425	\$799	13	17.1	18.1	19.3	45.5	640x350	20	.28	•	0	0	Ö	
PO's Limited EGA Monitor	\$479	13	12	13.9	15	80	640x350	20	.4	•	0	0	0	
Quadram Quadchrome Enhanced Display	\$795	13	11.5	15.25	17	58	640x350	18	.31	•	0	0	0	
Qubié Besic Time HR31 350	\$499	13	11	15	13	50.5	640x350	16	.31	•	o	ō	ō	
Tatung CM-1380-F	\$785	13	12	15.S	16	57	640x350	18	.31	•	0	0	0	
Thomson CM 4350	\$795	13	12.8	12.2	13.8	28.5	720x350	20	.31	•	0	0	0	
MULTISCAN MONITORS														
Electrohome ECM 1310	\$1,198	13	13	14	16	42	720x480	30	.31	•	0	•	•	
₩ JVC 60-H3214	\$895	13	13.8	14.2	15.7	59	720x600	30	.31	•	ō	ō	•	
Mitsehishi Diemond Scan AUM-1371A	\$889	13	12	14.4	15	62.S	800x560	30	.31	•	•	0	•	
MEC JC1401P3A MultiSync	\$899	13	13	13	13	43	800x560	30	.31	•	0	Ω	•	
Sony Meltiscae CPD-1302	\$945	13	11	13	15	47	900x560	30	.26	•	ō	ō	ō	
Taxae Super Vision 776	\$795	13	12	14	15	47	800x600	30	.31	•	0	0	•	
Teknika MJ-503	\$849	13	13	14	15	37	926x580	23	.31	•	0	0	•	
Thomson 4375M Ultra Scan	\$895	13	12	14.25	15	82.5	800x560	30	.31	•	•	Õ	•	

produce in the future, as well as with special graphics boards such as the Hercules Graphics Card, the Persyst BOB, Taxan's TGC, and others.

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With the problemation of new code

unless your is a declared application that
will never need a higher-resolution display—games and educational software,
for example. At the other extreme, it
makes little sense to go for the high resolution of the PICC standard unless your application demands: ii—high-end graphics
such as computer-aided design packages.

The PICC-computible boards are both pro
all bat a small percentage of personal com
puter users.

Thus, the real choice facing most of us today is whether to buy an EGA-compatible monitor or a multiscan monitor. That choice will depend on the type of software you expect to run on the monitor, and whether you want the option to upgrade to graphics standards that offer higher resolu-

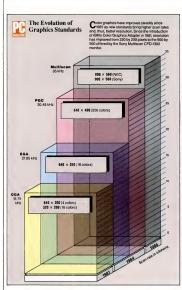
There are lots of choices for each type, and we've reviewed and tested ten EGA compatibles and eight multiscan models below. But the functional differences between these two types of monitors are not obvious.

obvious. An EGA-companible monitor is capable of reading two horizontal scan rates: [5,75] Akt 2 the CGA frequency) and 2,18,5 kHz the CGA frequency) and 2,18,5 kHz the CGA frequency) and 2,18,5 kHz the CGA frequency and 2,18,5 kHz the CGA standard. This is very important because not all software takes advantage of the higher resolution of EGA displays. It is also important because you can upgrade one step at a time; you can buy your EGA moration now and use it with your CGA moration now and use it with your CGA board until you can a frend to upgrade the

CGA-compatible monitors, such as IBM's Color Display, have a video band If you want a monitor that takes advantage of a wide range of graphics standards, you'll be more interested in the multiscan displays than the EGA compatibles.

width of 14 MHz. (Bandwidth is a measure of the speed at which a monitor can redraw the screen display.) EGA-compatible monitors must have a higher (faster) bandwidth of at least 16 MHz in order to meet the faster scan rate of the EGA sienal.

0	TPUTS		ONTR	N.S.							FEATURES						
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Multiscan monitors must have an even higher bandwidth in order to synchronize with the PGC signal of 30.48 MHz. Typically, the bandwidth of a multiscan monitor is 30 MHz or higher, though we tested one from Teknika with a bandwidth of only 23.

TESTING THE MONITORS The reviewers for this project, Vincent Puglia, Philip F. H. Rose, and myself, tested the monitors for resolution, clarity, color, glare resistance, and other attributes. Using two IBM XTs side by side, identically equipped with 640K RAM and IBM EGA

# SCREEN TERM

**PIXEL** is the same as dot. All display screens are made up of a matrix of pixels.

# ······

boards with 128K bytes of expanded memory, we compared each monitor to the original IBM Enhanced Color Display. We ran tests for text legibility, graphics clarity, image distortion, and color brightness and density and subjective personal tests using 1-2-3, Microsoft Windows, Xv-Write III, PC Paint, and other applications software. In all cases, we would first finetune the IBM Enhanced Color Display to its best display of the test screens, then try to match or better the results on the monitor under review. Each of us found things to like and dislike about all of the monitors, and we often disagreed, underscoring the importance of personal preference in monitor selection. After all, no two people see the same color the same way.

Whatever you do, don't assume that a monitor is a monitor is a monitor. Each monitor looks different to each computer user, and the one you prefer will be a combination of technical excellence, personal preference, and good price value.

preletence, and good price Value.

The monitors reviewed here are listed in alphabetical order by manufacturer. They include models that have been introduced since our last EGA roundup (see "The EGA Standard Monitors that Mealing and the properties of the Mealing of the EGA Standard Monitors that Mealing the EGA Standard Monitors that Mealing the EGA Standard Monitors of the EGA Standard Monitors and the IBM Enhanced Color Display and the NEC MultiStyne.

Phil Wiswell

EGA-COMPATIBLE MONITORS

MONITOR:

# Casper MC54

Unlike most of the EGA-compatible monitors reviewed here, the Casper MCS4 from TW Casper Corp. offers little in the way of enhancements over the standard IBM EGA display. It supplies the bare minimum in controls and offers only marginal improvement over the IBM design. It may be one of the least expensive models on the market, but you end up getting a little less than you paid for.

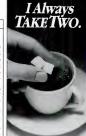
At the least, the overall design of the MC54 is aesthetically pleasing. The clean front panel has only two indicator lights-a green power-on indicator and a yellow indicator that is lit when the monitor is in CGA mode. This second light is an unusual feature, and it doesn't appear to be a highly useful one. Most people set the display mode only once, and a simple glance at the screen should tell you whether you are running under EGA or CGA mode, since the CGA setting will produce only 16 colors, instead of the full 64-color palette.

The MC54's on/off, brightness, and contrast controls are within easy reach on the left side of the monitor case. Because the dials are recessed, only a small tip of each control extends outward and the case's design lines flow smoothly. The rear panel includes controls for adjusting the vertical size in both CGA and EGA modes, establishing the brightness range,

and presetting the contrast. The bad news is that all of the controls are recessed, which means that even the simplest tweaking has to be done with a very small screwdriver.

For the most part, the colors on the MC54 are not to my liking. Depending upon how you set the contrast knoh, they are either tinged with too much red or too much yellow. This arises from Casper's treatment of brown. IBM's brown may not be the richest or most intense, but it is better than that produced by the MC54, which, at its best setting, is a washed-out

tawny color. If you're trying to clean up



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PC MAGAZINE August, 1986 "EDITOR'S CHOICE"

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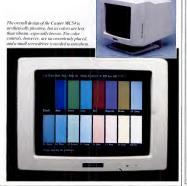
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#### ■ EGA VS. MULTISCAN MONITORS



the yellow, the brown turns to ocher; if you're going for a light red, the brown goes to burnt sienna. Adjusting the preset contrast control, of course, requires fiddling with a screwdriver.

On the positive side, the horizontal and vertical alignment are very good. Character legibility, while as good as other monitors, is hampered somewhat by glare.

Like the Oubié Basic Time HR31 350. the MC54 has a tilt/swivel base that provides a fair amount of movement. It also has a groove along the front base-a handy place to keep the screwdriver you're going to need for adjusting the controls.

For \$699, you shouldn't have to put up with inconvenient control placement and mediocre colors-especially when, for another \$100, you can move up to a multiscan display. Even if you're not interested in the high-resolution fast track and want to stick with EGA, there are other EGAcompatible monitors in this review that cost less and offer more. - Vincent Puglia

Compaq Color Monitor The Compaq Color Monitor is designed to work with Compaq Computer Corp.'s EGA board on various Compaq computers. There is nothing in the documentation about installing the monitor/board combination in anything other than Compaq computers, but the monitor works fine with IBM's EGA board, yielding both CGA and EGA compatibility. The Compaq Color Monitor may be connected only to an adapter with output signals of 15.7 kHz for 200 scan lines or 22 kHz for 350 scan lines



The bottom of this monitor is angled rather than flat. A tilt bar allows you to set the monitor face on either a 5- or 10-degree angle. Only an LED power lamp is visible on the front panel, with brightness, contrast, and power controls on the right side of the monitor. Vertical height adjustment is the only control on the rear panel.

Color graphics and text are not as clear as they are on the IBM Enhanced Color Display, nor as clear as most of the other monitors I tested. There seems to be less brightness and contrast control. Adjustment of the color bars is not very flexible on the Compaq, and I think most users will prefer more control. Also, screen glare presented more of a problem here, even after adjustment of the tilt bar

All things considered. I find no compelling reason to use this monitor on an IBM or compatible computer, unless it is a

Compag. However, a combination of Compaq computer, graphics board, and monitor will net you better resolution and some memory paging features not found in other systems .- Phil Wiswell



Compaq Color Monitor Compaq Computer Corp 20555 FM 149 Houston, TX 77070 (713) 370-0670 List Price: 5799 Requires: CGA or EGA bound.

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In Short: The Compaq Color Monitor is meant to be used only with Compay compa ers. Hooking it up to an IBM or compatible will result in substandard performance

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The IBM Enhanced Color Display, an Editor's Choice for the second year in a row, is still the standard EGA monitor to which all others are compared. The crispness of its display and the clarity of its colors are hard to beat, but as innovative low-cost competition gains ground, the venerable ECD is starting to show its ace.





# IBM Enhanced Color Display

This is the monitor that started it all, and it is still the yarshick for any comparison of EGA displays. Like most of IBM COP's standard-setting products, the IBM Enhanced Color Display (ECD) is a Soild, no-frills product, among the best in its class, but priced accordingly and with-court of the latest best of innovations. With the ECD, there's no text-mode switch, no intiple-resolution ability, and none of the

What you do get are consistency, reliability, and high quality. And, of course, you get the IBM logo.

IBM's standards have been surpassed in other areas—just ask Compaq—so I was honestly surprised, as I looked at the many entries in the EGA-compatible mar-

added features that some monitors offer.

ket, to find that the ECD is still ahead of much of the pack. The colors are among the best available in this type of display. There is a brightness and crispness in the



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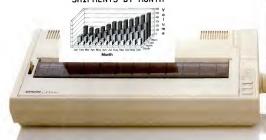
IBM Enhanced Color Display IBM Corp 1000 NW 51st St. Boca Raton, FL 33432 (800) 447-4700

List Price. S849 Requires. EGA or compatible card. to Short: The BM Enhanced Color Display offers outstanding quility, but the price is high and the monitor cannot offer the resolution improvements found in multi-scan paoni-

C MAY ON THE MOST SEED, THE

# OTHERS PALE B

# SHIPMENTS BY MONTH



both offer the same great feature

first dot matrix printers with reso

er quality. They quietly print at

y're versatile. A full range of mod

ths, transparencies, multiple-part f

The ALQ300 prints everything from the letter quality text you see here, to high resolution graphics in seven colors.

les, pitches and fonts.

The small printer on the left seems positively unexciting next to the new ALPS ALO300.

And it's not just because of our colorful personality.

You see, the ALO300 is a lot faster. It handles bidirectional graphics with flying colors. And for black and

white work-spreadsheets, letters, you name it-the ALO300 zips along as fast as 240 cps.

It can do more things. It has snap in/out 24- or 18-pin print heads. Multiple font cartridges. Paper handling extras like automatic single

> sheet feed and bottom feed. And of course, it runs with all the most popular PCs and software.

It's much easier to use, too. Because you do everything

# Y COMPARISON.



on the front panel. Change type styles and print modes. Load paper. Even override your software. All without software commands or DIP switches.

ALPS ....

You may have also noticed that the ALQ300 looks more substantial. It is. Theat it right and it'll run over five years without a breakdown.

You may also expect that the ALQ300 is more expensive. It isn't. Our 24-pin version has a suggested retail price of just \$995.

And our 18-pin model is \$100 less.

Now it's time to make your own comparison. Call us for a free demo or more information at (800) 828-ALPS. In California, (800) 257-7872.

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IT'S TIME YOU SAW THE ALPS.

CIRCLE 229 ON READER SERVICE CARD

# ■ EGA VS. MULTISCAN MONITORS

intense colors that is lacking in most of the competition. The IBM monitor also seems to be one of the only ones capable of generating a sharp, bright white. The only color that could use improvement is red; there is a dingy quality to it in this display. In our glare tests, the monitor performed moderately well at all angles.

You won't find many bells and whistles on this monitor—as usual, it is left to the competition to offer features that distinguish themselves from IBM and the rest of the pack. You will find a single RGB TII. input and four basic controls: power, brightness, contrast on the front, and vertical size on the back. The one clever touch that this monitor offers is a modifiable default setting for contrast.

When the contrast knob is pulled out, contrast can be adjusted within a range; when it is pushed in, the setting reverts to the default. There are two recessed controls on the back, operated with a screwdriver, to adjust the default contrast and brightness ranges. A number of other monitors offer default settings, but these usually consist of a fixed resting position of the dial that is not user defanished.

As anyone who has ever adjusted the colors on a TV set knows, "correct" color is a subjective matter; I have the contrast turned way down from the factory setting on my TV. After many adjustments, it's easy to lose the ability to tell what looks right.

With the IBM monitor, simply pash in the knob and you are back to normal to some factory-set normal, but your normal. As with other IBM monitors, the cable between the monitor and the display card is not removable a the monitor end and is less than 4 feet long. This can be very amonying and may make certain arrangements of your equipment, such as having the system until under a desk on the system will under a desk on the your possible.

Buying IBM, in this case, will get you the excellent quality and excellent color you would expect and, of course, absolute compatibility with the EGA standard. It will, however, come at a prenium price and will lock you out of the improvements in resolution offered by some of the new multiscan rate monitors.

-Philip F. H. Rose

The Missakish XC-141(C is a hip)-quality
EGA display that delivers rick and whene
colors along with a price tag, that more pail
products. The only real
products as expansion of colors as the pixel
fresh the remove long traveled lines as blass

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The state of the pixel
fresh the remove long traveled lines as blass.

# Mitsubishi XC-1410C

With excellent color and responsive controls, the Mitsubishi XC-1410C is a good alternative to the IBM Enhanced Color Display. Best of all is its \$649 price tag, which places the model among the less-expensive EGA-compatible monitors.

If you're put off by control panels that would be more a thome on the Stanhije Enterprise than on a PC monitor, you'll well-neer than on a PC monitor, you'll well-neer the small mamber of controls and their sensible placement on the Missubsiti and their sensible placement on the Missubsiti and their sensible placement on the Missubsiti and their sensible placement of their sensible placement stall—all early copy of the vertical height controls are read early accessible within a cutsway on the left side. Individuals with poor eyesight will find these two controls extremely useful since adjusting either one to its limit ensured to the placement of the placement o

larges the characters and produces an easily read display. (You will, however, lose five lines of text when you invoke this function.)



and sells for a lot less. If your budget is tight,

have a look at the XC-1410C.

Colors on the XC-1410C are generally rich and vibrant. The only exception is the light red, which is not as bright as the IBM ECD's but more intense than the rose produced by some of the other monitors reviewed here. Although the monitor has a contrast control, it has only a slight effect on the colors when in EGA mode.

on the colors when in the DAN mode.

The built-in fill bar located on the bottom of the monitor is more like the legs found on IBM keyboards than a true tilt stand. You can adjust the bar to provide a 50,95, or 100-degree angle, but since it does not tilt downward, you cannot pale the monitor anywhere above eye level. For that, you'll need an optional till/swivel stand.

The XC.1410C displays a slight separation of the colors on the pixel level. Fortunately, this separation is noticeable only if you produce a grid of intersecting white lines and study the lines close up. Under close inspection, the horizontal lines will demonstrate a line of red above the line and blue below each line. Most users won't notice the blur. For CAD users, though, it may cause some loss of color definition between drawn lines.

At its price, the Mitsubishi XC-1410C is an excellent value. If you are looking for an EGA-compatible monitor and aren't concerned about an upgrade path to higher resolution, you should investigate the XC-1410C.—Vincent Puglia

# **~~~~**

# Nanao 8042S

Although the Nanao 8042S is basically a standard EGA-compatible monitor, it enhances the IBM Enhanced Color Display





design by offering dial-selectable text modes. For this added enhancement, though, you pay a relatively steep price 2799

price-\$799. Except for the two vertical size knobs (which you will probably never touch because they are preset to an optimal size setting) in the back, all of the monitor's controls are easily accessible at the lower-right front panel. Two of them are related to the three available text modes-white, amber, and green. The other controls are for brightness, contrast, and power. Although the documentation fails to specify the proper sequence for selecting a text mode, you presumably select the desired text mode by first setting the Text/Color dial and then the W/A/G (white/amber/green) dial.

Interestingly enough, though, you can bypass the entire process by simply leav-

ing the Text/Color dial in the Text position and then turning the other control until it sits midway between its documented settings and displays the desired full color.

Colors on Nama's monitor are acceptable, but not exceptional. Any adjustments you may need to make are a simple matter of turning the appropriate control. While the vertical and bornzontal alignment are for the most part very good, the upper-left-hand corner displays a definite angular curve and the left border fuzzes somewhat. Also, glare is so prevalent at certain angles that you might consider using the monitor as a mirror.

The text modes simply change the display colors—they have no effect on resolution. In addition, if you set your color mode so that white is as pure as possible, switching into the white mode requires a contrast readiustment. Text legibility.

#### SCREEN TERM

# RESOLUTION is a measure of the number of pixels, or dots, the monitor can display horizontally and vertically on the screen. A high resolution makes a sharp screen image.

while relatively impressive in the amber and full-color modes, is mediocre in the green mode and terrible in the white mode. This latter problem is due to poor contrast with white characters against a gray background. Also, the guns do not shut off properly, and as a result there is extreme fuzziness along the borders.

On top of that, the white mode implementation appears somewhat illogical. If you call up the color bars in the white mode, black disappears into the gray background, and the last three colors-light magenta, yellow, and white-are displayed as white. The other colors are black. Now if the high-intensity bit were used as the deciding factor, the light red also should be white. If you go by logic, light gray, dark gray, black, and white should not change, and everything else should be shades of gray.

If white characters on a gray screen are your idea of a perfect display, you'll love the Nanao 80425-after all, it's more versatile than a true white-on-gray monitor. But if you're primarily interested in displaying graphics, you should look elsewhere-at \$799, the 8042S is too expensive for an EGA-compatible monitor that simply adds a pseudo-monochrome mode that you can duplicate with a simple BA-SIC program.-Vincent Puglia

PC's Limited

# EGA Monitor

The PC's Limited EGA Monitor (model XC-1430C) doesn't have a Mitsubishi label on it, but the familiar picture-tube The PC's Limited EGA Monitor is an OEM version of the Mitsubishi XC-1410C. For the buyer, this means a Mitsubishi monitor at a PC's Limited price. Colors are generally rich. with the exception of the somewhat pule light

shape, the little green power light in the upper-right-hand corner, and the manual-an almost exact duplicate of the one for Mitsubishi's XC-1410C-are dead giveaways. What this means to you, the buyer, is a Mitsubishi monitor at a PC's

Limited price (\$479). Like the IBM Enhanced Color Display. the EGA Monitor XC-1430C can be attached to any graphics card that outputs at either 15.75 kHZ or 21.85 kHz-which are the CGA and EGA standard bandwidths. The controls are limited to two vertical size knobs on the back panel and the brightness, contrast, and power controls on the left side. Like the Mitsubishi XC-1410C, the side controls are located within a cutaway depression about halfway to the back of the monitor. Unlike some of the other monitors that have their controls near the front, the placement is at

least a hand's length from the front.

While this is not a problem, it seems a shame that Mitsubishi hadn't placed at least the power switch closer so that an



PC's Limited EGA Monitor PC's Limited 1611 Headway Circle, Bldg. 3

Austin, TX 78754 (512) 339-6800 List Price: \$479

Requires: EGA or compatible card.

In Short: A no-frills EGA-compatible monitor, the PC's Limited EGA Monitor (model XC-1430C) is OEMed from Mitsubishi and offers excellent text legibility and respectable colors. At this price, you can't go wrong CIRCLE 644 ON READER SERVICE CARD

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easy slap on the side would turn the machine on or off. It would have been nicer still if the power switch were set flush against the front panel, as it is in the Mitsubishi Diamond Scan monitor.

In our first tests, the contrast control appeared to have no effect on the display at all. A glance at the meants showed that the control is operable only when in COA mode, and further testing upheld that view. (The contrast control on the Mistub-shi-labeled monitor, on the other hand, is operable in both modes, shough its seems to have little effect in EOA mode.) Because the PC's Limited GOA Monitor defaults to an almost perfect IBM-like color scheme, and the contrast contra

The PC's Limited horizontal and vertical alignment would be flawless except for a bit of color separation on the pixel level. (See Mitsubishi Diamond Scan AUM-1371A review.)

Instead of a tilt/swivel base, the EGA Monitor is equipped with a small bar on the bottom that works like the retractable legs on keyboards. The bar can be adjusted to three positions. But because maximum tilt is only ¼ inch, you may want to consider an optional tilt/swivel stand.

At \$479, this monitor is a steal—combining the mail-order savings of PC's Limited with the market-leader quality of a leading display unit manufacturer. —Vincent Puglia

# Quadram Quadchrome Enhanced Display

Af first glance, the Quadram Quadchrome Enhanced Obspiay resembles the IBM Enhanced Color Display sitting on a fillowivel stand. On closer inspection, you'll notice the small, dowel-like butto glowel-like butto five the small, dowel-like butto five the Color part of the Color of the Color

The Quadchrome monitor's front-panel controls mirror those of the IBM ECD in function as well as in form. That is, the contrast button includes a preconfigured The closest physic of close of the IBMECD B
the Quadrum Quadr brown Exhaused Displays
to school see the product does pure, and
to school see the product does pure, and
removed.

The title only be as a good to be a support of the product of the pr

optimum setting, and you need to pull it before you can adjust the contrast. When we first saw the Quadchrome (PC News, age S4, PC Magaztine, Volume 5 Number 9), text was visible even if you turned down the brightness and contrast knobs completely. This no longer occurs, implying better high-voltage regulation. However, turning the brightness knob to its maximum setting still causes a slight blurring of high-inensity text.

The test-enode button, which used to be inaccessibly located on the back panel, is now in the front. You may not love its outer-inch peglike shape, but it does respond easily. Pressing it cycles the modes from color to amber to green. While the text modes do not affect resolution, they do enhance legibility. The majority of the colors are clean, relatively pure, and pleasing to the eye. The brown is especially

nice-richer and darker than IBM's.

Testing showed near-perfect alignment and convergence. Clare seems greater than on the standard IBM enhanced monitor. And, while the Quadchrome displays slightly more shifting than does the IBM ECD during bursts of brightness, the shifts are not noticeable enough to be distracting.

The back panel features vertical hold, horizontal phase, and vertical size controls. You may never have to adjust these values, which is just as well—they're so deeply recessed you won't want to try. Since Quadram uses thumbscrew-mount-cables in its other products, why does it force you to dig out that screwdriver for the monitor controls?

Unlike some other tilt/swivel stands that are based on a cup-and-ball design, Quadchrome's has a flat base that allows you to detach the stand and place the moniEnd your backup nightmares.



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# EGA UPDATE

Some of the EGA monitors reviewed in last year's roundup ("The EGA Standard: Monitors That Measure Up," Volume 5 Number 6) are still available, although we have not reviewed them again. The following are encapsulated reviews taken from that article.

# Amdek Color 722

When compared with the IBM Enhanced Color Display, the Amdek Color 722 shows a mixed bag of readability and color. One test that displayed single-pixel wide lines of different colors side by side showed a sharper contrast on the Color 722 than on the IBM EDC. But in the enhanced-mode color-bar test, the Color 722 could not match the vibrant pastels of the IBM monitor.

the IBM monitor.

The monitor's readability and color are certainly acceptable alternatives to those of the IBM display. However, the Color 722 has a fundamental design difference that can be disturbing

terence that can be disturbing. When switching between the 200-line and 350-line video modes, the Color 722 emits an audible thunk, the display area shrinks, you see some screen static, and then the display quickly swells back in normal. Amdek Corp.'s engineers explained that a mechanical relay does the switching because people like to know

when the video mode is changed, but not all users will appreciate this deliberate and slightly disconcerting design quirk.

# Princeton Graphic Systems HX-12E

The Princeton Graphic Systems HX-12E looks very much like the IBM Enhanced Color Display, although the display area is a bit smaller. On the from are two knobs, the top one a pull-on power switch combined with contrast control, and the bottom one a brightness control, which must be set at three-quarters of full or more to avoid plunging the screen into darkness.

The HX-12E's cotors are very bright, but in the EGA 330 by 640 graphs mode, solid browns and yellows become difficult to achieve. Because the contrast control affects the dark cotors, there is a problem using programs that employ both low- and high-intensity text. The best readability of low-intensity text makes the high-intensity characters too bright and musty.

On the color-bar test, the bright white and yellow bars developed faint violet splotches after a few seconds, although the other colors were fairly good. Overall, the HX-12E is recommended only if you can get it at a very good price. The new monitors are tough competition.—Donald P. Willmott



Amdek Color 722 Amdek Corp. 2201 Lively Blvd. Elk Grove Village, IL 60007

(312) 364-1180 List Price: \$759 Requires: IBM Enhanced Graphics

Adapter.

In Short: The Amdek Color 722 delivers about the same overall quality as the IBM Enhanced Color Display. Its contrast is somewhat better, but its colors are not as

somewhat better, but its cotors are not as good. Its mode-switch design is poor.

DIFFIELD STANDARD STANDARD COMP.

Princeton Graphic Systems HX-12E

Princeton Graphic Systems

601 Ewing St., Bldg. A9 Princeton, NJ 08540 (609) 683-1660 List Price: \$785

Requires: Enhanced Graphics Adapter. In Short: The HX-12E is a good monitor but not a great one. It is difficult to adjust its contrast settings to get good color. Whate and yellow are problemanic.







Princeton Graphic Systems HX-12E



Quadram Quadchroms Enhanced Display Quadram Corp. One Quad Way Norcross, GA 30093

Necross, GA, 30903 (dol) 923-6666. List Prices 5795 Requires EGA or compatible card. In Short: The Quadram Quadchrome Emhanced Duplay may be a bite epositive, but in stays close to IBM specifications and adds a fill wavier stand and two text modes. Characters are crisp, and colors are more than ascernable.

CRICLE 643 ON READER SERVICE CARD

tor directly on the system unit or a desktop. The stand raises the monitor approximately 3 inches from the desktop, swivels a full 90 degrees in either direction, and tilts about ½ an inch down and 2½ inches up.

When we first reviewed the Quadchrome, we found it a good alternative to the IBM ECD. Now that Quadram has addressed the minor problems we mentioned in our first look, the monitor is an even better value. It's not the cheapest EGA compatible out there, but it is one of the better ones.—Vincent Puglia

# Qubié Basic Time HR31 350

The Qubié Basic Time HR31 350 monitor may not look like much, it may not have the purest of colors, and it may seem to sit a little too precariously on its till/swivel stand, but for \$499 (\$599 with the 256Kbyte EGA card), you can probably live with these little faults.

will take cities takes. What 3 350 are take to make the part on the IBM Brahande Color Display; three keeks on the frost panel for power, contrast, and brightness, plus two vertical size controls in the back. Even the case is similar. The major differences, however, are the lack of a pushlyfull feature for setting a default optimal of the displayment of the control batton, and a tilkswise base that causes the monitor to rock when touched. The stand raises the monitor inches from the desktoon, allows a swiyed of inches from the desktoon, allows a swiyed of

75 degrees, and tilts it about 3 inches. While the stand is detachable, the cup-andball design prevents you from placing the monitor flat on a deskton.

monitor flat on a desktop.

Colors on the HR31 350 tend to be richer than those of the IBM EGA palette.
Light magenta is more purplish, and the light red has a rosy cast. Adjusting these colors to make them lighter causes other

hues to go out of sync.

According to a Qubié spokesman, the
HR31 350's black matrix screen creates a
grid fine black lines that reduce diffusion and allow you to brighten the monitor
to the maximum setting without blurring
the image. Another result is that you can
black out the screen by turning the brightness all the way down.

The HR31 350 monitor has excellent vertical sync recovery: images do not bounce more than 15 percent of the screen (other monitors can bounce up to five SCREEN TERM

DOT PITCH measures in millimeters the

distance between the illuminated centers of any two adjacent dots, or pixels, on the screen. A small dot pitch makes a high resolution.

\*\*\*\*\*\*\*

times as much). On the other hand, while testing the regulation of high-voltage supply, the HR31 350 displayed more distortion than the IBM monitor. When looked at with a program that drew a grid, the HR31 350's vertical lines displayed a

The Qubié Basic Time HR31 350's winning feature is its \$499 price tag. Some of its colors und to be rich and intense, and attempting to lighten them up will cause other hues to go out of sync.



# A JAPANESE GARGANTUA: MITSUBISHI XC-3700SS



Even the most jaded conventioneers at Fall Comdex waxed poetic about the astonishing piece of hardware they had seen at the Mitsubishi booth: a stunning, 37-inch, high-resolution multiscanning monitor.

This versatile video giant, codenamed the XC-3700SS, stands over 5 feet tall on its custom-designed base and weighs in at 308 pounds. Missubishi trought the new model to Comdex from Japan to gauge customer interest. It took only a few droiling corporate buyers to convince the company, which also builds those gigantic Diamond Vision screens for stadiums, that they might have a big 2<sup>8</sup> winner on their hands.

The XC-3700SS is being marketed for TV conferencing, showroom product explanation, and public information service media, but its computer applications are extensive. The monitor displays text without distortion and can handle as many as six character sizes in several fonts. Fully IBM EGA, CGA, and PGC computible, it has a horical resolution of 640 dots and a vertical resolution of 480 dots and a vertical resolution of 480 lines. Missubish spec sheets say that "most personal computers may be used." with the XC-3700SS. Video inputs (for VCR, laser disk, and video camera hookup) are also readily accepted.

A Mitsubishi representative says production quantities of the XC-370SS should arrive in the U.S. during the second quarter. With the planned retail price said to be under \$10,000, sates may be brisk, both to corporations and to PC users with money to burn who like to kick back and watch a video movie after a long day at the keyboard.

For more information, contact Mitsubishi Electronics America Inc., 991
Knox St., Torrance, CA 90502, (213)
515-3993.—Donald P. Willmott

slight waver: color bars bowed toward the viewer's right, suggesting some distortion problems which indicate that the Qubié Basic Time HR31 350 may not be state of the art.—Vincent Puglia



vel stand and its colors aren't the best, but it is

cost-effective, especially when bundled with

the Qubié EGA-computible card

E 642 ON READER

Tatung CM-1380-F

The Tatung CM-1380-F is a CGA and CGA-compatible monitor that automaticulty adjusts to either horizontal scanning requency, but you cannot use this model to the control of the control of the controllate in the way of picture control-joint and vertical size. A text-mode switch is incontrol, brightness, horizontal position, and vertical size. A text-mode switch is included for viewing the screen in shades of either amber or green, but it is inconvemently located on the rear panel—and you sharp, however, whether viewed in amber or green modes.

The CM-1380-F has an attractively designed cabinet. Its nearly flat, recessed antiglare screen reduces most glare to less-than-normal levels, and I was very impressed. Glare protection is better than that of most other monitors—even the NEC MultiSync, which also has impressive glare protection.

review, the CM-1380-F fared poorly in the color bars test. Although the colors could be made brighter than those on the IBM Enhanced Color Display, they were not as clearly defined and the bars themselves ended to bend at the edges. This was disturbing. I could adjust for the distortion, but not without bringing contrast and



tion, both in text and graphics, is good, but its

colors aren't as intense as the IBM Enhanced Color Display's.

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# LASER PERFECT VISION.

imagine your PC being able to see photos, graphics, illustrations end precisely position them on your reports end proposals before they appear in print on your ieser printer. Preview the graphic impact of charts end tables, modifying et will, before pressing the print button.

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The LS-300 cen be used with your PC system with CGA, EGA or monochrome displeys, or teamed with the new Princeton LM-300 or LM-301 Print Preview Monitor, the LS-300 provides you full pege visuel effects before printing. And teamed further with an optional OCR software package, the LS-300 is trained to reed and store typewritten pages.

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Alto aveilable is an SCST interfece Mac Scan't for the Apple MacIntosh. You can scan, edit and store a visitely of Mac desktop sublishing applications — MacPaint, AlccWrite. Page maker, PassaySpart Cal. The Control of the Control of the Mac Cestop Mac Market Market

Princeton Graphic Systems Number One Again 601 Ewing Street, Building A, Princeton, NJ 08540 800-221-1490, 609-683-1660 (NJ only) EXT, 92 Telex: 821402 PGS PRIN

Princeton Graphic Systems Number One

\*New Image Technology, Inc. 10300 Greenbelt Road Seebrook, Maryland 20708

# PGC: THE "STANDARD" TIME FORGOT

You remember the Professional Graphics Controller.

That was IBM's other graphics product, introduced back in September 1984, at the same time as its Enhanced Graphics Adapter and Enhanced Color Display.

The \$1,500-plus EGA/ECD parlay was supposed to be Everymm's improved color graphics choice; so-called professional graphics users (architect, angineers, artists, and so on) were supposed to flock to the PCC and its companion Professional Graphics Display. That the PCC combination cost \$4,300 (sans PC) wasn't supposed to matter for

those who really cared how their displays looked.

Hah. After muddling along for a while due mainly to IBM's high prices), the EGA suddenly took off. The PGC never even got a good muddle going. With 640- by 480-pixel resolution, the PGC package was just too close to the EGA's 640 by 350. Sure, the PGC package was just too close to the EGA's 640 by 350. Sure, the PGC package was analog, so you could have 256 colors out of 4,096 on-screen, but the product was a kludge: slow, slow, slow.

And if you think the original IBM EGA board is a maze of too many chips on too much real estate—to say nothing of its ridiculous piggybacked memory board, without which it makes no sense at all—you have to see the PGC to understand mazes. The PGC takes two full slots in your PC and cranks out enough heat to qualify as an expensive (but colorful!) wienie rosaster.

THE FATAL BLOW Poor Missubish produced a far faster, more elegant PGC/PGD combination last year, with most of the electronics built into the monitor's base and with only one short card to stick in your PC. But the fatal blow atta few software vendors wrote drivers for the PGC. With the rise of NEC Multi-Spne-style monitors and the new "Super

The Tatung CM-1380-F display colors ore not clearly defined and the color bars themselves tend to bend of the edges. Adjusting for this distortion hinders contrast and brightness.





brightness down below satisfactory levels. Still, this monitor offers plenty of control over brightness and contrast—more than most of the other monitors I tested.

Tatung Co. of America offers an optional \$599 half-length graphics adapter, called the TEGA-22, which allows you to run the monitor emulating monochrome graphics, color graphics, or enhanced color graphics modes.—Phil Wiswell

~~~~

# Thomson CM 4350

As \$795, the Thomson CM 4350, from Thomson Consumer Products Corp., is one of the more-expensive EGA-compails be monitors in this soundup, Granted, the monitor gives you a few useful enhancements, but they tend to be of the type found in other, less-expensive models as well. The major additions on the CM 4350 include a text mode, a half-intensity setting on the contrast control, and a tilt/swivel

stand.

The CM 4350 comes with two oversized controls and a rectangular pushburtion on the front panel. You select the text
mode with one control and the contrast
with the other. Although there is no front
panel brightness control, the contrast knob
allows you to select a default half-intensiy. If you wish to adjust the brightness further, you need to use the control on the
back panel. Also on the back panel are

EGA" cards such as the VEGA Deluxe, which offers (ahem!) 640 by 480 resolution (though still just 16 of 64 colors without dithering), not even the Mitsubishi designers could resuscitate the moribund PGC nonstandard.

The PGC remains an object lesson on how quickly a supposed "new standard" can be made obsolete by passing time, stiff pricing, clumsy design, better technology . . . and, of course, the small matter of providing value to buyers.

—Jim Seymour

Jim Seymour is a contributing editor of PC Magazine.

three more switches: a vertical hold and

two vertical size controls. If you want white, the Thomson 4350 is the monitor for you. In fact, it displayed the brightest white of all the monitors tested. If you wonder how bright this white really is, ask the data entry clerk who's wearing sunglasses. True, you can lower the brightness by switching into the halfintensity mode, but then you lose your brown. That does not mean you can ignore the half-intensity setting, since that is how you get the most legible, almost IBMish characters. And if you attempt to adjust the brightness by fiddling with the rearmounted control, you might lose any color compatibility you may have.

Then again, if you are working within the text mode, you may not care if your brown is red and your yellow is permeated with green. I found text legibility of both

# SCREEN TERM

SCANNING FREQUENCY, or synchronization, measures in kHz (kilohertz) the graphicsboard-to-monitor signal that lines up data properly on the screen. High scan rates mean better resolution.

\*\*\*\*\*\*\*

the amber and green modes to be less satisfactory than the comparable modes on the Quadram Quadchrome. The amber is especially bad since the characters tend to blur, the green is better but only if you use it at half-intensity.

The tilt/swivel stand for the Thomson CM 4350 is of the flathed variety. This means you can detach it from the monitor and place the monitor flat on the surface of your choice—almost. The CM 4350 comes with a fixed video cable that 's 28½ inches long—almost. The you put your monitor on the desk and the system unit on the floor. Also, using either tilt or swivel is not as smooth an operation as you might like.—Vincent Puglia





Thomson CM 4350 Thomson Consumer Products Corp 5731 W. Slauson Ave., #111 Culver City, CA 90230 (800) 325-0464 (213) 568-1002

List Price: \$795 Requires: EGA or compatible card. In Short: The Thomson CM 4350 matches the specifications for an EGA-compatible

monitor and has very hright white text resolution, but it is hampered by the length of its cahle and the difficulty in attaining satisfactory contrast and brightness.

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# MONITOR RESOLUTION: THE BIG PICTURE

There's more to resolution than meets the eve. Here are the qualities to look for when you're choosing an EGA or multiscan monitor.

A monitor's resolution depends on a combination of five characteristics: dot pitch, dot size, dot shape, brightness, and purity of color. Monitors with a smaller dot pitch (the distance between dots) often have better resolution. (Note below the difference in clarity between the sample from the PC's Limited EGA Monitor, which has a dot pitch of .4 millimeters, and the Sony Multiscan CPD-1302 with its .26 pitch.) But monitors with brighter screens will also yield a crisper picture (note the JVC GD-H3214 sample). Color purity can keep dots from blurring together and produces a cleaner image. In addition to these factors, characters on a screen look different when viewed from various distances. A monitor whose characters look blurred when magnified may have a crisp picture when viewed from a foot away. Finally, resolution is highly subjective. It's best to compare clarity and color yourself before buying.



Compaq Color Monitor Dot pitch: .4mm



Mitsubishi Diamond Scan AUM-1371A Dot pitch: .31mm



Mitsubishi XC-1410C Dot pitch: .4mm

Taxan Super Vision 770 Dot pitch: .31mm



PC's Limited EGA Monitor Dot pitch: .4mm



Nanao 8042S Dot pitch: .28mm



Thomson 4375M Ultra Scan Dot pitch: .31mm



Sony Multiscan CPD-1302 Dot pitch: .26mm



NEC JC1401P3A MultiSync Dot pitch: .31mm

Quadram Quadchrome Enhanced Display Dot pitch: .31mm



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Oubié Basic Time HR31 350 Dot pitch: .3 Imm

IBM Enhanced Color Display

Dot pitch: .31mm

Teknika MJ-503

Dot pitch: .31mm

Thomson CM 4350 Dot pitch: .3 Imm

Electrohome ECM 1310 Dot pitch: .31mm

Tatung CM-1380-F Dot pitch: .31 mm

Casper MC54 Dot pitch: .31mm

JVC GD-H3214 Dot pitch: .31mm

# ■ EGA VS. MULTISCAN MONITORS

#### MULTISCAN MONITORS

# Electrohome ECM 1310

The Electrohome ECM 1310 has separate inputs for RGB TIL and RGB Analog, providing compatibility with CCA, EGA, and PCC display boards—a definite plus if you want to push the monitor to its highest resolution. If not, this feature is probably just costing you extra. In that case, look for a CGA/EGA-compatible monitor and forest about PCC.

The front panel has just three controls: power, brightness, and contrast. Vertical and horizontal size and position controls are on the rear of the unit. This monitor offers very little in the way of manual picture control.

The 13-inch diagonal display doesn't provide much glare protection, and I found the glare slightly distracting. The 0.31 dot pitch is only average, but the monitor does display sharp, crisp color bars, which could be made brighter than those on the IBM test monitor through more contrast and brightness control. However, the top line of the text was slightly slanted in the color bar test-almost italic-and I could not make an adjustment to eliminate the problem. The company assured me this is not how its monitors look, but if you're shopping, it would be wise to ask for a fullscreen display of color graphics and text just to be sure there is no skewing of the top

Otherwise, for text and graphics legibil-





ity. I prefer this monitor's display to the IBM Enhanced Color Display. Text is brighter and slightly larger in both directions, and I found it easier to read than the content of the color Display and the Color Display much more for this monitor just to have PCC compatibility — This Wiswell.

# JVC GD-H3214

JVC Information Products Co. of America's entry into the multiscan monitor market takes the base that NEC built with the MultiSync and improves on it.

With the same maximum horizontal scanning rate as the Sony Multiscan CPD-1302, a little better than that of the NEC MultiSync, the JVC GD-H3214 opens the door to higher resolution when used with a display card and software that go beyond the EGA standard.

The colors on this monitor are the close to IBM's that have seen. The red and brown are a little warmer (which I consider an improvement), and although the intense colors aren't quite as bright, this is one of the only monitors other than IBM's that: Text is capable of generating a pure white. Text is excellent, as good as that displayed by the IBM Enhanced Color Display.

Unfortunately, the JVC product has a real problem with glare. It rated as one of the worst in all light situations, due to a shallow bezel and an extreme inward curve of the glass at the top. If you have a problem with glare, you should test this monitor in various lighting conditions be-

fore buying it.

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There are two separate RGB inputs on | the back of the monitor, one for digital and one for analog. There is a button to switch the digital input between monochrome and color modes. This is better than input with



JVC GD-H3214 JVC Information Products Co. of America 41 Slater Dr Elmwood Park, NJ 07407 (201) 794-39(K) List Price: \$895

Requires: EGA or compatible card ort: An improvement on the NEC

MultiSync that includes what the new Sony Multiscan CPD-1302 should have included JVC's multiscan competitor is a real winner though the last set is identified as PGC. I found that this mode became active when using a display card such as the QuadEGA ProSync that operated above the top of the EGA range of 26.5 kHz. After working through the unnecessarily complex process of setting up all four modes, adjusting each of the 16 controls on the back with a screwdriver while looking at the screen, I was finally ready. My monitor could switch between Hercules graphics, EGA text, CGA graphics, and the 640 by 480

mode of Windows, all without any adjust-

a number of switches, but it can get rather

confusing, especially when carried over to

the vertical and horizontal size position

operating at different ranges of horizontal scanning frequencies, corresponding to

CGA, MDA, EGA, and above EGA. Al-

Each input has four separate screws.

controls.

# SCREEN TERM

# BANDWIDTH

measures in MHz (megahertz) the speed at which the monitor is able to accept data from the

computer. \*\*\*\*\*\*

ments to the monitor. This makes the concept of using a multiscan monitor to switch between the multiple standards more palatable, but the setup is a bit much.

The power switch and controls for brightness, contrast, and fine tuning of horizontal and vertical position are on the right side of the monitor near the front. They are behind an inward slope and protrude from the case, so that when you place your hand over the edge, your fingers rest easily on them. This is a comfortable and aesthetically pleasing solution to control placement

The JVC GD-H3214's superb color and clarity put it at the top of my list. Its mode adjustment is clumsy but solves a major annoyance with multiscan monitors. Unless glare is a major consideration (and it shouldn't be), this is the multiscan monitor to go with .- Philip F. H. Rose

PGC card.)

# Mitsubishi Diamond Scan AUM-1371A

When I first unpacked the Mitsubishi Diamond Scan AUM-1371A (see also the Thomson 4375M Ultra Scan review), I was a little surprised to see an analog cable with a 25-pin connector on one end and loose wires on the other, alongside the standard 9-pin PC cable. Fortunately, the presence of both cables prepared me for the comucopia of controls on the back panel. What I really wasn't ready for, though, was the prominently displayed "Engineering Sample" label just above the controls. (Just as we were ending the review process Mitsubishi sent a production model that included an analog cable configured for the

The Diamond Scan accepts video.

The Mitsubishi Diamond Scan AUM-1371A brings together high resolution, versatility, and excellent display characteristics. Some of the colors lack vibrancy, but they are generally high-quality

TTL, and analog input signals and provides controls for video color and tint, vertical and horizontal positioning and sizing. two scan modes, and monochrome selection. In addition to the back-panel controls, the Diamond Scan has an on/off switch set flush against the front panel, an unobtrusive power-on light, and contrast and brightness dials. The last two, located beneath the Mitsubishi logo on the left, were mislabeled on both the preproduction and production units.

By manipulating the contrast and brightness controls, you can almost but not quite duplicate IBM's colors. Some of the high-intensity colors, such as yellow and light green, lack the vibrancy of the IBM Enhanced Color Display; others, especially light red, appear somewhat washed out. By the same token, though, you may prefer the regular-intensity colors because of their richer and less-muddy appearance; this is especially true for red and green. While the Diamond Scan seems to reflect more glare than the IBM ECD at cer-



Requires: EGA or computible card In Short: The Mitsubishi Diamond Scan AUM-1371A-a multifeatured multiscan monitor built around Thomson's specifications-provides power, flexibility, and excellent display characteristics CRCLE 637 ON READER SERVICE CA

tain angles, text legibility is extremely good. The characters are exceptionally crisp, so much so that if you were to stand the Diamond Scan alongside some of the other monitors in this article, the result would be comparable to the difference berevent BM's EGA- and CGA-compatible monitors. The basic character design is the same as IBM's.

The monochrome mode puts out an extremely legible green text. If you crank the brightness and contrast all the way up, the display area brightness to the point at which a noticeable light blue border appears and the green takes on the quality of a light green. Even if you highlight a block of text—such as with WordStur—the characters remain legible, although there is a slight pulsation of light. This problem does not occur in any of the other modes.

Besides the slight pulsation in the monochrome mode, the Diamond Scan had one other oddity. When you switch between modes, there is the definite clicking sound of a relay being set. While this may not affect the monitor's performance, it can cause concern to an electronics-shy

The scan button enables you to over-to-underscant the display. Underscanning provides the normal screen width, according to the documentation, and the Diamond Scan automatically adjusts the scan mode dependent upon the frequency. The effect of a manually imposed oversam is similar to having a large-print newspaper. Although the feature is meant for use with video input signals, users with poor eyesight might find themselves swelching to make the control of the property of t

The Mitsubishi Diamond Scan is an excellent multiscan monitor that is at least as polished as the comparable IVC and NEc monitors. Between its sylish cabinet and crisp characters, it should find a home on many a desktop, With its ability to superimpose analog and video signais, (displaying, for example, television pictures and computer graphics at the same time) reguently a resolution of 800 doss by 560 lines, it offers versatility and power.

"Vincent Puells"

#### \*\*\*\*\*\*\*

# NEC JC1401P3A MultiSync

The NEC JC1401P3A MultiSync is a superb value in the realm of continuous-frequency-scanning monitors. It scans horizontal sync rates from 15.75 to 35 kHz, automatically adjusting to the signal from a wide variety of graphics adapter boards. Thus, the MultiSync is compatible with IBM's CGA, EGA, and PGC, as well as all compatible adapter boards, and is an excellent choice if you plan to upgrade from CGA to EGA or from EGA to PGC in the future. To use the MultiSync with a PGC adapter, you simply plug in the video cable and toggle the switch on the rear panel from TTL to analog input. It ran beautifully on the ProSync board in my testing.

Designwise, the MultiSync is a work of

art. Its deep screen bezel helps reduce glare, as does the tilt/swivel stand that allows angling of the display in both up/ down and right/left directions.

Controls for brightness, contrans, and vertical and horizontal size and position are located beneath a small door on the top of the monitor. These controls can be reached from a seated position, but you can't tell which knob you are turning unless you memorize their positions. I found this and the rear panel location of the power switch slightly annovine.

Rather uncommon for a monitor, the MultiSync comes with a set of DIP switches on the rear panel that allow you to configure it for other than CGA or EGA sync rates. More important, these switches also let you select the color of your text—red, green, blue, yellow, cyan, magenta, or white—and this color selection may be set.

A your offer its introduction, the NEC

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# ■ EGA VS. MULTISCAN MONITORS



to override the color selections for text made by software applications. If you can't find a color for text you like on the MultiSync, you won't find it on any other monitor.

Color graphics are extremely sharp and bright on the MultiSyne. Brown was the only color I could not adjust so that it looked better than the IBM EGA display. Otherwise, I prefer the features and performance of the MultiSyne hands-down over IBM's display. The MultiSyne is one of the best all-purpose monitors you can buy right now.—Phil Wiswell

# \*\*\*\*\*\*

# Sony Multiscan CPD-1302

When NEC came out with its MultiSync, it took the competition by surprise. Now, approximately a year later, we have Sony Corp. of America's response to the challenge. The result is a mixed bag.

The Sony Multiscan CPD-1302 features typically attractive Sony styling and a somewhat flat screen. The screen slopes off to the sides at a normal angle but is virnually flat vertically. While the flatness practically eliminates glare at 30 degrees and 45 degrees, there is negligible difference from other monitors when dealing with more direct glare.

With the power on, the monitor has a slight rosy hue and the colors are mediocre. The Multiscan's red is better than the IBM Enhanced Color Display's red, but brown and magenta are overly red, while vellow and white are noticeably blue.

Even when the vertical size is adjusted to condense the text slightly, text is more

Like Son's other products, the Sony Multicron
CPD-1302 is solid and well designed.
Unformative, the display does not piece well in
concept is not be their moultant protected.
display is less crisp than one expects in a

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broken up than on the IBM monitor. This may be due to the use of a strip-based approach to representing images, rather than the standard tri-dot method, but the result is text that is slightly less crisp than I exnect from the ECD standard.

The maximum resolution claimed is 900 by 500, compared with the NEC Multisync's 800 by 500, and the EGA standard of 640 by 350. If you plan to use a display board that has maximum capabilities within the EGA standard and do not fore-see upgrading, this feature won't interest you, but with high-resolution boards and software that take advantage of it, it can greatly improve image resolution.

Power, brightness, and contrast (labeled "Picture" on the monitor and "Contrast" in the manual) are on the right six enear the front. The dials, though large, are recessed almost completely, making them

a bit awkward to operate. The usual size and position controls are on the back, behind a panel that comes completely off and would probably be lost straightaway in my office. Both the monitor cable and the



and well designed, but the display quality

falls short. ORCLE 636 ON READER SERVICE CARD



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# SCREEN TERM

TTL, or "transistor-totransistor logic," is simply digital input. TTL graphics-board-tomonitor input limits colors. Analog input allows almost unlimited color possibilities.

# ·····

power cord are cleverly placed at an angle of about 30 degrees and recessed, reducing clearance needed in the rear. There is a single RGB input on the back

There is a single RGB input on the back and a pair of switches that allow you to configure it to analog for the IBM PGC or as one of three digital modes: RGBI for the CGA: automatic adjustment between EGA, CGA, and MDA: and a third referred to as "NORM for TTL RCB output, such as the IBM 3270." While a little confusing, these two switches are certainly preferable to a row of numbered DIP switches.

Sony's reputation for quality precedes in, and this monitor has a solid feel to it the design and features would put it near the top of the class. Unfortunately, the one area that is most important in an EGA monitor, the image, is where the Mulliple-scale-rate monitors only, the Sony would fare better, but in the boader category both color and text were well below the best, and for this reason I cannot recommend it.—Phillip F-H. Rose

# Town Com

Taxan Super Vision 770
The Taxan Super Vision 70 is a ventaile continuous-frequency-scanning monitor that offers four switch-operated modes to support CGA, EGA, PGC, and Taxan 955 standards. The attractive case houses a 13-inch diagonal CRT monitor that uses a small blake border like that of the NEC MultiSyne to belp prevent the image from distorting near the edges of the screen or spilling over them. This border is adjustable through the horizontal and vessale throu

The Tatan Super Vision 770 supports CGA,
EGA, and PGC graphics, as well as Tatan's
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size and position controls via dials on the right front of the monitor and subcontrol screws on the rear panel.

Supposing and installing this monitor tusies less than 5 minutes. The Super Vision 710's power and video cables are not hardwired to the back of the unit. The power cable must be plugged into its sock-to the rear panel of the monitor and then to the contract of the monitor and the computer. I can think of no disadvance used with screws to both the monitor and the computer. I can think of no disadvance and the computer. I can think of no disadvance are not provided to the contract of the co

Tiny, unobtrusive power lamps on the front panel let you know when power is on and whether you are running the monitor in TTL or analog modes. The Super Vision

770's screen has a special nonglare surface that does a good job of cutting down reflected light. The particular model that I reviewed did not come with the optional till/swivel stand, which would likely have

FACT FILE

Taxan Super Vision 770
Taxan Corp.
18005 Cortney Ct.
City of Industry, CA 91748
(818) 810-1291
List Price: 5795

Requires: CGA, EGA, PGC, or Taxan 555 card.
In Short: The Super Vision 770 performs well and is equipped to accept upcoming improvements in display technology.
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Price? The Amdek 1280 monitor and video board cost only \$999. So, if you work with desktop publishing, CAD or Lotus, Amdek's 1280 graphics subsystem is clearly your best buy.

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# GLARING RESULTS

Clare is a subjective matter. While some people aren't annoyed by the screen glare created from overhead artificial lighting, others prefer more-diffused light, and still others opt for working in a darkened office where the only light sources are from windows and from the monitor itself.

Since no two reviewers react the same way to glare, we created a test to produce quantifiable results to help buyers compare monitors on the basis of their resistance to glare.

The testing apparatus consists of four diffused spotlights positioned vertically at 30-degree, 45-degree, 60-degree, and 90-degree and 90-degree and to simulate overhead light, the 45- and 60-degree angles can be compared to a desk lamp, and the 90-degree lamp simulates direct light such as that coming from a window.

Behind the spotlights we mounted a Sekonic Digispot I percent spot meter on a tripod to measure the reflection on the screen at its brightest point. The meter produces a digital reading between 0 and 100 percent. (For reference, a matte black card gives a reading of 4 percent.)

and a mirrored surface registers 96 percent on the meter. In photography, a standard noneffective surface, such as grass or fur, is simulated by an "18 percent gray card," which is a matte gray card that gives a reading of 18 percent.) Detailed results appear in the benchmark tests chart

We also measured the screen's reflectivity with an Ascor Digimatic Reflecting Densitometer. This device is placed against the surface and has its own internal light source. We didn't expect the Ascor's zero-distance readings to be much different from the 30-degree results, but they were. The zero-distance numbers were all in the 12- to 15-percent range, even though the variation in the 30-dispute results ranged from 15 percent. 12- BV CG DH-8214 multiscan monitor registered a 23 percent reading in the 30 degree test, but only 14 percent in the zero-distance reading. Even the most glaur-resistant screen surface can-not overcome the problems caused by the curvature of the plass.

All ansigher traits seemed to lose importance when the light source was more direct than 45 degrees, since all the readings as 60 degrees were within a 6 percent range above 67 percent, and all 90-degree readings were above 71 percent, also in a 6 percent range. These numbers are too close to be significant, as more of the monitors tested were able to stand up to the direct light. The widest discrepancies came in the 45-degree readings, in the standard of the significant of the processing of the significant of the processing of the significant of the control of the significant of the significant percent of the significant of the significant of the control of the significant of the significant of the percent of the significant of the sig

While differences of less than 10 percent are probably not even visible, a 25 percent or 50 percent difference could be significant.—Philip F. H. Rose

helped reduce the glare even further.

Colors on the Super Vision 770 are bright and sharp, even the often-difficult throwns, and the color har test appeared ex-

bright and sharp, even the often-difficult browns, and the color bar test appeared extremely close in quality to that of IBM's EGA monitor. The brightness and contrast

■ Colors on the Taxan Super Vision 770 are bright and sharp, including the often-difficult browns. dials, located on the right front of the unit, offer as much control as the IBM motitor's dials, which is to say I wish I could get a little more brightness and contrast. Text leighbilty is good, though not excelent, and perhaps this is related to the previous complaint. I work with text on my screen for many hours each day, and I would want to have a little more control over its appearance than is available from the Super Vision 770.

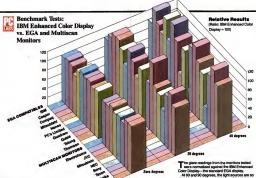
Over its supplication. On our avanation resident the Super Vision of floatings of this monitor the Super Vision of floatings of this monitor (and one of the most compelling reasons to buy it is that you can run it now with COA or EGA boards and can look forward to using it with a PCC board or with Toxan's SSS high-resolution board in the future. A separate RGB analog input on the rear panel is used for these display adapters. We are an Microsoft Windows on this monitor rear Microsoft Windows on this monitor

with the ProSync board, and it looked gorgeous. However, if you don't plan to upgrade to the higher-resolution displays, there is really little reason to choose this model.—Phil Wiswell

# SCREEN TERM

RGB is an abbreviation for "red-green-blue."

An RGB color monitor uses three separate electron guns (one for each color) to light up the screen pixels.



# **Monitor Glare Resistance** (Actual light readings given in percent of reflected light)

Thomson 4375M Ultra Scan

| Product                             | Zero degrees | 30 degrees | 45 degree |
|-------------------------------------|--------------|------------|-----------|
| EGA COMPATIBLES                     |              |            |           |
| IBM Enhanced Color Display          | 14%          | 15%        | 519       |
| Casper MC54                         | 14%          | 17%        | 699       |
| Compaq Color Monitor                | 14%          | 19%        | 589       |
| Mitsubishi XC-1410C                 | 12%          | 19%        | 519       |
| Nanao 8042S                         | 14%          | 17%        | 729       |
| PC's Limited EGA Monitor            | 15%          | 13%        | 529       |
| Quadram Quadchrome Enhanced Display | 15%          | 19%        | 759       |
| Qubié Basic Time HR31 350           | 15%          | 17%        | 619       |
| Tetung CM-1380-F                    | 14%          | 13%        | 289       |
| Thomson CM 4350                     | 15%          | 17%        | 599       |
| MULTISCAN MONITORS                  |              |            |           |
| Electrohoms ECM 1310                | 13%          | 15%        | 719       |
| JVC GD-H3214                        | 14%          | 23%        | 769       |
| Mitsubishi Diamond Scan AUM-1371A   | 14%          | 16%        | 631       |
| NEC JC1401P3A MultiSync             | 13%          | 15%        | 559       |
| Sony Multiscan CPD-1302             | 14%          | 272 211%   | 219       |
| Taxan Super Vialon 770              | 13%          | 17%        | 619       |
|                                     |              |            |           |

octed and the

spectively, the Sony Multiscan CPO-1302 and stung CM-1380-F are much more glare resist an the other monitors, due no doubt to their reens. At the other end of the spectrum are the /C GD-H3214 with a 76 percent reading and the

At 30 degrees, the Sony, the Tatung, and the C's Limited EGA Monitor offer slightly better re stance than the other products (in the 11 to 13 rount range), while the JVC again exhibits low

glare tolerance, with a 23 percent reading.

Glare resistance is a property of the monitor screen and has nothing to do with the type of mor. There is no reason to expect a multiscan mor.

# ■ EGA VS. MULTISCAN MONITORS



IBM Enhanced Color Display
 JVC GD-H3214
 NEC JC1401P3A MultiSync

If you're sure you'll never want to upgrade post the EGA standard, you should hoy an EGA-compatible monitor, not a multiscan. Among the EGA compatible, our foundation, and the EGA compatible, our foundation, the EGA compatible, our foundation, the EGA compatible, and the EGA compatible, and the EGA compatible our exceptionals to clean, text is crisp and highly legible, and you get IBM Corp. Sequention for reliability. But at \$849, it's not cheep:

a snot eneap.
Though it's not an Editor's
Clucice, the PC's Limited EGA
Monitor is a great buy if you're
looking for a bare-bones display at a
rock-bottom price. An OEMed Missubsish EGA compatible, it offers
excellent text legibility and acceptable color compatibility. At \$479,
it's hard to go wrong with this one.

Among the multiscan monitors. we find ourselves arguing the virtues of both the NEC JC1401P3A MultiSync and the JVC GD-H3214 (both retail at around \$899, but street prices are much lower). So we must give the Editor's Choice to both. NEC's MultiSync features text in your choice of seven colors, excellent control over color and contrast, and a tilt/swivel stand that allows for viewing at any angle. The JVC GD-H3214 also displays beautiful, clear color graphics and text. Setting its somewhat numerous switches for the multiple inputs is a bit confusing, but once they are set you can switch between four different oranhics standards without making any changes to the JVC's switches. The JVC's only drawback is its minimal glare protection, which might be a problem if you're really affected by glare.

# Teknika M.J-503

This multiscan monitor is a direct competitor to the NEC MultiSync, with nearly identical features and price. Making a choice between the two is really a matter of performance.

picture with the NEC Multilyon and other multiscan monitors, the Technica MJ-503 automatically adjusts to the scarring frequency coming from the adapter board, ranging from 15 to 34 Hzt. It is compatible with the CAG, EOA, and PCC boards, the latter requiring northing more than a toggle swith from TLL to analog input. Although the Teknika monitor uses a monglare screen surface, reflected light monglare screen surface, in the Cag of the NEC Multilyon (see sidebus "Glaring Results").

The nicture controls on the MI-503 are

FACT FILE

Teknika MJ-803
Teknika Electronics Corp.
333 Re. 40 West
Farafield, NJ 07006

COLISTS-GISSO
List Price: SS49
Requires: CGA, EGA, or PGC board,
In Short: At SS49 the MJ-503 is a good buy,
but an extra S50 will get you the clearly supenot NEC MultiSync.
CHICLE 632 ON REACH SERVICE CAPO

identical in function to those of the NEC MultiSync—brightness, contrast, horizontal and vertical size and position, and a text switch. Brightness, contrast, and horizontal position controls are located conveniently in the front panel of the monitor,

Positioned as a direct competitor to the NEC MultiSyne and priced SSO less, the Tebrika MJ-SOS offers good control over brightness, but its colors aren't as sharp or well-differentiated as the MultSyne's. The MultiSyne remains superior and is worth the extra money in the





and the rest are on the rear panel. This makes the text switch difficult to reach. The only color available for text is green, unlike the seven text colors available on the NEC MultiSync.

The color graphics of the MJ-503 provide brighter colors than the IBM Enhanced Color Display, as do those of the NICC, but the colors themselves are not as shap or well defined. You can make all colors brighter on this mentior than you can't get as much differentiation between normal and high-intensity colors as you can on the IBM or NEC displays. Test is on the IBM or NEC displays. Perhaps this contribution of the NEC displays. Test is on the IBM or NEC displays. Perhaps this contribution of the NEC displays on the NEC.

Compared with monitors in the \$1,000and-up class, I prefer the MI-503. For less money, it offers almost the same performance. But the performance of the NEC MultiSyne is clearly superior to that of this Teknika, and it's only \$50 more. The extra \$50 would be well spent on the NEC, in my opinion.—Phil Wiswell

## Thomson 4375M Ultra Scan

Aside from its logo and a few cosmetic features, the Thomson 4375M Ultra Scan monitor is a lot like the Mitsubishi Diamond Scan AUM-1371A (see review). The similarities are no coincidence either—a Thomson spokesman says the monitor was a joint project undertaken with



The Thomson 437M Ultra Sour is almost identical on the Metabolish Diamond Sou AdM-137A. The monitor was a ping profess with Massidok, with Diamond Sou and Massidok, with Diamond Source and Source an

Mitsubishi, with Thomson supplying the

specifications. Like its Mitsubishi cousin, the Thomson 4375M seems to have difficulty controlling brightness in monochrome mode. With the EGA board properly configured, the monitor's monochrome mode produces extremely legible green text but only if the brightness is brought to its lowest limits. However, if you crank the brightness all the way up, the entire text area becomes covered with a high-intensity veil, which, when you are using highlighted text, such as that produced for word processing block operations, begins to shimmer and pulsate. Even if you lower the brightness completely and adjust the contrast so that the display is barely visible, a shimmer still persists. The pulsation on the Mitsubishi monitor, on the other hand, is very faint.

Oddly enough, though, the Mitsubishi monitor may have displayed the same problems controlling high-voltage regulation as the Thomson monitor, but they were not as pronounced; evidently, Mitsubishi tweaked a few controls before ship

■ The Thomson 4375M Ultra Scan is a lot like the Mitsubishi Diamond Scan AUM-1371A. The similarities are no coincidence.

# How Will Your LAN Server Handle Rush Hour Traffic?

What happens then? When everyone on your local area network is actually on the network? Unfortunately, that's when a lot of so-called servers will do your LAN a disservice. By jamming up, and slowing down. And maybe even stalling.

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Dealer. Of Call 1-000-LANKIND.



NetWare Servers 286A, 286B and 68B.



280A, 260B mill Cob.

\*286A and 286B bundled with SFT NetWare Level II. 68B bundled with SFT NetWare Level I.

\*1987 Navel, Inc., Warld Headquarters, 122 East 1700 South, Prove, Ulos 84601 (801) 379-5900

Milestones Ahead.

#### ■ EGA VS. MULTISCAN

ping its own production model.

As with the Mistabishi Diamond Scan, the Thomson 4375M UIm Scan has a multitude of controls on the back panel. With no more than a simple flick of the writing, you can adjust the vertical and horizontal size and positioning, under- and overscan the image, select monochrome or normal mode, and add color or tint to your video signal. With the additional ports, you can superimpose an analog signal over a composite video signal if you wish.

The brightness and contrast controls are located to the left undemeath the front panel. To the right is the push button, but it does not compare with the sleek look produced by the flush setting Mitsubishi uses for its switch. Also, the Mitsubishi moniforits witch. Also, the Mitsubishi moniforits witch.

■ In spite of its problems, the Thomson 4375M is an excellent monitor,

but because of them, the Mitsubishi version is recommended.

tors are supposed to be the same, but the 4375M was unable to display a pure white when initially powered on. Instead of the clean white characters you might expect, the text was heavily tinged with red, producing a distinct pinkish color. If you leave the monitor on long enough, the characters lose their pinkish tint and become more while.

In spite of these problems, the Thomson 4375M is an excellent monitor. However, because of them, I would recommend buying the Mitsubishi version.

—Vincent Puglia

Vincent Puglia is a frequent contributor to PC Magazine. Philip F. H. Rose is a PC Labs project leader. Phil Wiswell is a free-lance writer based in New York. He is a frequent contributor to PC Magazine and runs a computer consulting business.

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# TAKING BACK the DESK

mong the rewards of business success are more windows and a bigger desk: the windows of bat you can better see the world in which you play a larger part and the desk to bear the burden of your increased responsibilities. Those whose offices—physical ad titular—are not yet trimmed in mahogany and gilt must endure in darkness with desk space not half as large as their worries.

Innovative engineers and industrial stylists are downsizing PCs with a zeal second only to that of the candy makers searching for better ways to make less look like more.

The computer only adds to the space problem of the executive whose time has not yet come, taking up a major fraction of the already well-populated desktop. The average PC, with its CPU. monitor, keyboard, and who knows how many peripherals, leaves precious little room for shuffling papers and dealing with the many other impediments to a successful day of decision making.

However, hope is neuter than the offpromised promotion or partnership that drags with it a larger desk of real wood anther than one of enameled steel or plastic-layered beaverboard. Innovative engineers and industria sylliss are downizing only to that of the candy makers who are continuously searching for better ways to make less look like more. As a result, important inches have been shaved from many computer models. The yield is a result of the properties of the properties of the smaller than standard deskion computers.

Best of all, a small computer doesn't have to mean Lilliputian performance. Downsized system units can be found in every range of PC and AT compatible. Today both some of the lowest-cost and highest-performance machines boast small desktoo footprints.

Most of today's smaller machines are not the result of the miracles of electronic miniaturization such as surface-mount technology. They are instead entirely conventional computers out of which a lot of air has been squeezed. They are products of internal reorganization rather than electronic breakthroughs.

As such, they hint at the potential of size-reduction technologies. Today's machines—with no circuit changes—are 30 percent smaller than they used to be. With advanced VLSI (very large scale integration) internal components, smaller disk drives, and surface-mount components, tomorrow's computers will be niner still.

Portable computers and Sperry Corp.'s amazing PC/microlT (reviewed in "Competing at the Top: High-Performance ATs," PC Magazine, Volume 6 Number 2, and recapped in this issue) hint at how far these technologies can go in cutting desk usage down to size.

Downsizing system units is not without its drawbacks, however. Shrink a PC too far and you lose space for expansion boards and disk drives.

The need to maintain compatibility with existing expansion hardware imposes a limit on just how small a system unit can be made. Nearly every system requires some space for expansion boards, and to-day's PC standard requires the system unit be at least 13 inches long and about 5 inch-

es high for true compatibility. So cutting out expansion slots gains no length (or depth) and only a few inches of width.

cepth) and only a lew incres or whum. Hence, the most common methods of making a PC more compact are making the trive slots smaller or cutting the number of drive bays from two to one. Fortunaely, all-height higher-density drives allow almost the same amount of storage in a smaller space, allow allow allow to sacrifice disk storage in a small-floorprint computer. Larger hard disks, however, still require a full-height format to containal their platters.

from the heftier AT chassis, some PC designers have tried to compromise on space for disk drive installation by using skyscraper technology—that is, keeping the usage of desktop real estate down by building vertically instead of horizontally. The result is taller computers with drive bays that are 50 percent higher, enough to accommodate three half-height storage decommodate three half-height storage de-

UPWARDLY MOBILE Taking their cue

vices. Despite the tricks, however, you're still certain to lose some expansion space, either in expansion folso of orive bays, if you there in expansion folso of orive bays, if you standard PC has six slote, and while some of the computers reviewed here have as many as eight, tohers have only three.) The saving grace of a smaller system is that few people actually need two 150-megistry behand this and eight expansion slots. The only systems that are likely to be so and those machines rately abon the average and those machines rately abon the average of the property of the property of the state of the property of t

age executive's desk.
There are, of course, other ways to regain some of that desktop space without rerefing to a computerless office. You can reduce the footprint of a full-size machine by standing in one off. Goe sidebet "Sidesepping the Desktop Dilemma." If you lead to disaster, you can part the machine are tit to your desk using an inexpensive mental to your desk using an inexpensive from your desk entirely (I keep nime in a footbet using extension cables to connect

However, these solutions can take their toll in convenience (especially in my case). If you use a lot of floppy disks,

the display and keyboard.

you'll want your disk drive slots nearby—like right in front of your eyes, under your monitor. And that's where the smallfootprint computer fits best.

Certainly these littler PCs aren't perict. No machine made can yet claim to be. But they can be more convenient and attractive than their full-size breth-ren—and, as with any PC, they can help the perice of the p

#### Tandy 1000 EX

to go-and stumbles.

Just when you thought that every compatible was based on the same immutable IBM layout—a rectangular box with drives on the right and a detachable keyboard—Tandy/Radio Shack introduces the 1000 EX. Evidently designed for those tom between Apple styling and the IBM standard, the 1000 EX reads where no clone has dared.

The 1000 EX looks like a knockoff of the Apple IIc quasi-portable computer. With an integral keyboard, a short system unit with proprietary expansion, and a 5¼inch drive slot on the right side of the 3- by 17- by 13-inch case, the shape and styling of the 1000 EX bear an uncanny resem-



The resemblance ends there. The 1000 EX uses an 8088 microprocessor that runs at either PC-standard 4.77 MHz or high-speed 7.16 MHz. The operating speed is selected when the machine is switched on. It defaults to the higher speed; you must press 4 right after boot up or use a software command to slow it down.

Despite its high-speed microprocessor, the 1000 EX is only a moderate performer, yielding nowhere near the double speed its fast clock would imply. In fact, it is cores only 20 percent faster than a standard IBM PC in PC Labs benchmark tests. At IIIms, the 1000 EX lagged 10 percent behind the IBM machine (even when the Tandy was running at its top pace). The 4.77-MHz, at best 10 percent slower than the standard IBM time.

In addition to the keyboard and disk drive, the 1000 EX also has a built-in CGA/monochrome/composite display adapter, a printer port, an expansion jack for a second disk drive (5¼ or 3½ inch), and two joystick (game port) adapters. Standard memory is 256K bytes and is not nority checked.

No connector is provided for the printer port of the 1000 EX other than the edge of the system board. You must use a special Tandy adapter cable to tie in your parallel printer. Ditto for the disk-control port.

NEEDS PROPRIETARY CARDS The 1000 EX accepts only proprietary expansion cards; it will not work with standard IBM expansion products. Tandy expansion to the 100 EM expansion options include memory expansion up to 640K bytes, achieved through a combination of a 128K and a 256K proprietary memory card, and a Tandy internal 300 1200 bit-per-second modern. (The modern was not reviewed, but Tandy claims it is frage-temporable buttlenged in the 100 EM employed that the 100 EM employed the 100 EM employed that the 100 EM em

Tandy notes that the 1000 EX will directly operate either a standard (Radio Shack) RGB display, a monochrome dis-



The Tandy 1000 EK has an unmistokable Apple IIc—like appearance, with the access to its one disk drive placed on the right side of the machine. The keyboard is of Tandy's own design, and all expansion cards are proprietary.

play, or a high-resolution display. While technically correct, the statement is misleading. Only low-resolution (9- by 9character matrix) composite monotome monitors are supported (the computer will not operate an IBM-style TTL monochrome display). The 1000 EE is compair to the best with Tandy high-resolution monitors just as IBM Enhanced Graphics Displays are compatible with standard color/graph-ics adapters—they work but only in low-resolution CGA mode.

In addition, the timing of the video signal of the evaluation 1000 EX was so far off the IBM standard that the 25th line of the display disappeared behind the monitor bezel of a non-Tandy display used for testing purposes.

For anyone accustomed to the IBM standard, the keyboard is a terror. Although 12 function keys are arrayed along the top row and a dedicated invented Teursor pad is provided, the layout of the 90 cold keys (and some keys are really oddly placed) is a nightmare. Finding your favorite keys is a guessing game. Alt, for instance, is stuck between the alphanumeric and dedicated number keyndas. The Back-

slash key is hidden on the 7 key in the number pad and requires both turning on Num-Lock and pressing Shift (and the 7 key) to activate it. The touch of the keys is erratic and light with some audible and tactile feedback. but not enough.

The only good reason for building the keyboard into the system unit is cost savings. Although those savings are wonderful for computer makers, users don't fare as well. Integral keyboards are less conveient than separate ores because you can't move them away from the system unit and put them on your lines or other places for more-relaxed typing. That drawback is more-relaxed typing. That drawback is ever; because it is so small you can put the whole machine on your lap if you prefer typing that way.

"Ms-DOS 2.11 and GW-BASIC
are supplied as standard equipment with
the 1000 EX, as is Personal Desk Mate, an
integrated package that includes a word
processor, spreadsheet, database, calendar, communications program, and grant
so, It's all the software you'll need—until
you discover how much better commercial
programs can be. Good compatibility with

third-party software is assured by a Phoenix BIOS, though the 1000 EX will not run PC-DOS 3.2.

The 1000 EX is not so much a machine you would buy as it is a computer you might be sold by some slick salesman. When its features are glibly rattled off, the 1000 EX sounds impressive. As a machine for anything but playing games, however, the 1000 EX has severe limitations. The worst of these are proprietary expansion, no provision for a hard disk, and its odd keyboard. Its only strong suit is that it runs MS-DOS, and that's hardly enough justification to put up with its manifold shortcomings.

#### Epson Equity I

The least-expensive name-brand (as opposed to house-brand and mail-order) PC around, the Epson Equity I is everything the unlamented PCir should have been: compatible and uncrippled. Based on a 4.77-MHz 8088 microprocessor, the Japanese-made Equity I, from Epson America, performed exactly on par with a plain PC in PC Labs benchmark tests. Its expansion slots are totally PC compatible, and the system seems ready, willing, and able to run any PC software you can slide into its drive slots. The standard operating system for the Equity I is MS-DOS 2.11, which, together with GW-BASIC, is included with the machine.

FACT FILE

Epson Equity I Epson America Inc 2780 Lorreta Blvd. Torrance, CA 90505 (213) 539-9140

adapter, \$129.

List Price With 256K RAM and one floppy disk drive, \$795; with two floppy disk drives, \$995; with 20-Mbyte hard disk, \$1,395; monochrome display, \$149; monochrome

Requires: Display and adapter-In Short: The Epson Equity I is a low-cost PC compatible with PC performance, 256K RAM, and three full-length expansion slots. If you want a second floppy disk drive, pro-

prietary cables require that you buy the overpriced Freen unit FROLE 642 ON READER SERVICE CARE

Standard system memory is 256K bytes in one eight-chip bank of 256K-bit, 150nanosecond dynamic chips, not parity checked. Through use of standard memory expansion or multifunction cards, system

memory can be increased to 640K. Both a parallel port and a serial port are built into the system board, both using XTstandard 25-pin connectors. An 8087 numeric coprocessor can be added to the base system, though no socket is evident (most of the system board is covered by a subchassis holding the disk drive bays and

power supply). Compared to the IBM PC, the Equity I looks small but tall. Although it's about the same height as a PC at 5 by I4 by 14 inches, its narrow width makes the case

look higher. The front of Equity I has more secret panels than a grade-B horror film. One in the upper left hides the power switch (connected by a long shaft to a switch in the power supply at the rear of the chassis). A door at the bottom left covers the keyboard connector, and a slot in the side of the the keyboard is plugged in. A third, wide door, tucked beneath the drive bays, gives access to the system-configuration DIP switches

The rear of the Equity I is decorated with a plastic fascia panel that labels the various jacks and gives you something else to remove before you have access to the insides of the machine. The power cord is nonremovable, and an IBM-style jack is provided for plugging in a monitor.

As with most small-footprint computers, space is saved by slicing off drive bays-the Equity I has space for only two half-height devices-and excising expansion slots. There's room for only three XTstyle 8-bit slots-one of which is needed for the display adapter.

Enson allows three drive options-one or two floppy disk drives or one floppy and a hard disk. All floppy disk drives are XTstandard double-sided, double-density (360K-byte capacity) 51/4-inch units manufactured by Epson that use a novel pushbutton mechanism for latching in and ejecting disks.

The Epson floppy disk drives feature a



Epson America's Equity I is one of the most inexpensive, completely compatible, name-brand PCs on the market today. Space is saved in the computer's design by including only two half-height drive bays and three expansion slots, one of which will probably be taken up by the display adapter.

proprietary cabling and connection scheme (they attach directly to the system board so that no floppy disk controller expansion card is necessary) that precludes adding your own drives made by other manufacturers—and presumably justifies the outrageous \$300 surcharge for a second drive (versus the \$100 street price).

The open-frame linear power supply—no shiny chrome-plated box!—offers one normal power connector, which you will find useful for adding your own half-height hard disk. (The evaluation unit was equipped with two floppy disk drives.)

Although squared off to match the rest of the system, the Equity Is eyeboard conforms to the layout of the original AT keyboard with enlarged Eiter and Shift keys, ten left-hand function keys, and a combined cusord/numeric keypad. Unlike most compatibles, however, it lacks indicators on its locking Shift keys. Although it lacks audible and tactile feedback, it is adequate for normal typical.

The review unit was supplied with the optional Epson monochrome display system, which closely mimics the similar IBM system, complete with long persistence green phosphors. The only differences are in the details the Epson characteristic production of the control of the contr

At its \$795 retail price, the Equity I rates as a good buy despite its forcing you to trade off a couple of drive slots and some disk drive compatibility. At the \$500 to \$600 price offered by some dealers, the Equity I may be the best value in a budget computer.

#### Tandy 1000 SX

The plastic case of the Tandy 1000 SX is minimalist, if not solid looking. Pry open the lid and you'll see every little circuitry within—most of the machine has been reduced to proprietary VLSI (very large scale integration) chips. Even the thin steel inner shell looks like it was pressed out of a



One reason the Tandy 1000 SX is so small is that it accommodates only short expansion cards in its five 8-bit slots. Most of the system board circuitry is contained in proprietary VLSI chips, which also helps to save a large amount of space in the system unit.

bunch of flattened fruit-juice cans.
That said, the 1000 SX is not an unlikable computer. At 5 by 16 by 12 inches, it's almost diminutive, and its styling fits with the visions of the future soothsayers had 10 years ago. Moreover, it works reasonably well.

It's faster than the original IBM PC because its 8088-2 is set to run at two speeds,



Tandy/Radio Shack 1700 One Tandy Center Fort Worth, TX 76102 (817) 390-3300 List Prices With 384K RAM and two floppy disk drives, 5999 Requires; RGB or composite monitor In Shortt A PC compatible with 384K

Tandy 1000 SX

In Short: A PC compatible with 384K RAM, two floppy disk drives and five expansion slots that do not accommodate fulllength expansion cards. A stripped-down, though not unlikable, machine. ORGE 641 ON REAGERSTANCE CARD PC-standard 4.77-MHz and 7.16 MHz. The operating speed can be changed by pressing a function key (but only when the machine is booted) or by software. The default is the faster speed, which gives performance about 20 to 30 percent faster than an IBM PC, according to PC Labs benchmark tests.

The standard MS-DOS 2.11 operating system of the 1000 SX allows access to a huge library of PC-compatible programs. Yet the machine does have its incompatibilities. Like many older compatibles, it will not run PC-DOS 3.2. And its foreshortened case will not accommodate fulllength PC expansion cards in its five XTyet 8-bit expansion sols (all of which are available for expansion in the standard configuration of the system).

Standard memory is 384K bytes, supplied by the unusual combination of one bank of four 4 by 64K-bit dynamic RAM chips and another bank of eight 1 by 256Kbit chips. It is not parity checked. Eight sockets await memory expansion up to a full DOS 640K through installation of the ubiquitous 1 by 256K-bit chips.

#### SPACE SAVER UPDATES

Three previously reviewed smallfootprint computers remain contenders in the battle for the desktop. The Sperry PC/microIT was reviewed in "Competing at the Top: High-Performance ATs," PC Magazine, Volume 6 Number 2: reviews of the AT&T 6300 Plus and the ITT XTRA XP appeared in "The In-Between Machines: 80286-Based Compatibles," Volume 6 Number Condensed versions of the reviews appear below.

#### AT&T 6300 Plus

The AT&T 6300 Plus, made in Italy by Olivetti, gets about as far away from the IRM standard as it can while still claiming PC compatibility. It bases that claim on seven expansion slots into which PCstyle cards will fit. An eighth slot is for

AT&T's proprietary expansion products. The chassis is rather tall because of its unusual stacked two-piece system-board layout. The guts of the machine are tucked underneath the expansion slots and the power supply. The narrowness of

the box is attributable to the single fullheight drive bay; into which one floppy disk drive and one hard disk will fit.

AT&T offers both a 20-megabyte Seagate hard disk and a 40-megabyte high-performance hard disk as options: the latter is a far better choice because it will not hamper the performance of the speedy microprocessor.

The keyboard, also sold as an option, has its function keys arrayed across the top in order to keep it as narrow as the system unit.

The 6300 Plus is really meant for UNIX, but it will run DOS as an application under UNIX System V using AT&T's Simul-task software. If you can't wait for a multiuser, multitasking version of DOS, you might want to investigate UNIX on the 6300 Plus.

#### ITT XTRA XP

The ITT XTRA XP is the smallest of the 80286-based XT compatibles. And compatible it is-all the way down to its 8-bit bus structure.

This means that the machine is rather slow (though it holds its own against the IBM PC XT Model 286), and its sluggish hard disk compounds the problem.

The inclusion of just one full-height drive bay accounts for the small size of the XTRA XP, and inside there are only five expansion slots, though they are spaced at generous 1-inch intervals to accommodate wider cards. The large system board comprises the whole bottom of the chassis.

The XTRA XP keyboard closely follows the PC standard and has a light and rather soft touch with little audio or tactile feedback.

One of the most striking features of the machine is its monitor, which is the same width as the system unit. Its height also matches the system unit's width, and the result is a sleek, one-piece appearance that stands out even on the messiest

It seems that the glory days of the XTRA XP are gone, however, It's a solid, workable computer, but its future is limited by its 8-bit expansion.



#### FACT FILE

AT&T 6300 Plus AT&T 1 Speedwell Ave.

Morristown, NJ 07960 (800) 247-1212

List Price: With 20-Mbyte hard disk, 360K floppy disk drive, \$3,675; keyboard, \$150; monochrome monitor, \$295; color mitor, \$795; MS-DOS 3.1, \$65; UNIX System V, \$395.

In Short: An 80286-based XT with proprietary 16-bit expansion, 6-MHz, a no-waitstate clock, and a medium-performance hard disk. It rates as the least expensive AT&T system with UNIX capability CIRCLE 654 ON PLACER SERVICE CARD

ITT XTRA XP ITT Information Systems 2350 Oume Dr San Jose CA 95131 (800) 321-7661 (800) 368-7300 (in Calif.) List Price: With 640K RAM, one 1.2-Mbyte floopy disk drive, \$2,995; with 30-Mbyte hard disk (Model 3), \$4,299. Options include an 80287 Intel data processor.

360K floopy disk drive; 12-inch monochrome monitor in either green or amber, \$189; dual monochrome monitor (amb and green), \$225; 14-inch color monitor, \$545 In Short: A sleek 80286-based XT com patible with proprietary 16-bit bus and 6-MHz, no-wait-state microprocessor CIPCLE 653 ON READER SERVICE CARD

Sperry PC/microIT

Sperry Corp. Information Systems Group P.O. Box 500

Blue Bell, PA 19424 (800) 328-1015 (215) 542-4011

List Price: With 512K RAM, \$2,345; with 1.2-Mbyte floppy disk drive and 20-Mbyte hard disk, \$3.815; keyboards, \$150 to \$200; medium-resolution monochrome monitor, \$680; EGA monitor, \$849. In Short: The Sporry PC/microlT is remarkable for its size and is an Editor's Choice, even if its hard disk option is too

CIDCLE SAN ON READER SERVICE CAL

#### Sperry PC/microIT

The Sperry PC/microIT was the first computer to achieve AT power in a box smaller than an ordinary PC. The system unit is scarcely wider than two disk drives and is only 5 inches high. Its low-slung appearance is made possible by positioning the five expansion slots on the horizontal plane. Cards are inserted sideways on the left, and so any AT-compatible card will fit.

There is room for only two half-height disk drives in the PC/microIT, and the machine comes with neither a floppy disk drive nor a hard disk, ostensibly so that the computer can serve as a diskless network node.

Sperry Corp. offers a 1.2-megabyte floppy disk drive and a 20-megabyte hard disk as options; unfortunately, the hard disk, with an average access time of only 86 milliseconds, is so slow that it outweighs all the advantages of the no-wait-state microprocessor.

Despite the slow hard disk, however, the Sperry PC/microIT is a desktop pleasure, and its peripherals, from monitors to key-boards, are certainly good. This machine is definitely a harbinger of the smaller, faster computers of the future.—Donald P. willimott



The chastis of the ATE 6300 Plus is unusually tall because of its stacked two-piece system board layout. Only the seven 8-bit expansion stots and the power supply are visible on top. Although essentially a UNIX machine, the 6300 will run DOS under ATE T's Simultask software.



When Sperry Corp.'s PCImicroIT was reviewed in "Competing at the Top: High-Performance AT3;" PC Magazina, Volume 6 Number 2, it was named Editor's Choice for its remarkable site. Barely wider than two disk drives and barely taller than a fullbeloth drivine; it mark AT power in a package smaller than a PC.



The ITT XTRAIXP is both the oldest and the smallest of the 286based XTs. Its tiny system unit has one full-size drive bay, which holds a floppy disk drive and a hard disk, and inside there are five expansion slots, spaced I inch apart.

# MAKE YOUR IBM **PC** FASTER THAN AN AT.



Introductory offer

DON'T TAKE OUR WORD FOR IT. USE IT FOR 60 DAYS, IF YOU ARE NOT TOTALLY SATISFIED RETURN IT FOR A FULL REFUND.

It sounds great; the idea of a speedup board that you can just plug right in as easily as putting bread in a toaster. How wonderful to be able to convert a PC or XT to a \$4000 AT without the expense. But even when you get ready to spend \$395.00 you want to be sure your choice is the very best. Here at PCSG we sell our IBM PC disk access speedup software by the thousands. But software doesn't do any thing about speeding up the microprocessor (or CPU) speed.
As you know the microprocessor is the brain of the computer that controls all the operations like screen updates and calcu-lations like a spreadsheet makes.

#### Faster and smarter than an AT-PCSG guarantees it.

We wanted to offer a speedup card that would be the compliment to our disk speedup software, (incidentally in-cluded at no extra charge.) We wanted it to be literally the most advanced, fastest, most feature rich board available today. We could only be satisfied with a board that was the finest example of the engineering art.

nnest example of the engineering art. There is no question we have met our every objective by developing and manufacturing the BREAKTHRU 286 cart. This is the best designed and most functional speed up card available today. We guarantee it. HERE IS WHAT MAKES IT SO SPECIAL.

First, it installs so easily. It is a half slot card, only five inches in length. You don't even have to give up a full slot. What's more, unlike competing products it works in the Compaq and most clones. The instructions are so simple w considered showing a picture of a child putting it in. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

Second, it is advanced. The BREAKTHRU 286 replaces the CPU of the PC or XT with an 80286 microprocessor that

is faster than the one found in the AT. A 16K cache memory provides zero-wait-access to the most recently used code and data. In benchmark tests the card accelerated software programs—both custom and off-the-shelf anywhere from to as much as 700%. Wow!

Third, you have full compatibility. All existing system RAM, hardware, and peripheral cards can be used without software modification. It operates with LAN and mainframe communication products and conforms to the Lotus/Intel/ Microsoft Expanded Memory Specification (EMS). Software compatibility is virtually universal.

Fourth, it is the best there is. There are several other boards on the market. Some are priced about the same as the BREAKTHRU 286 and some are cheaper. We at PCSG have compared them all, but there simply was no comparison. Compared uncovaried but that samply was no comparison. What we discovered but many cards being sold offer only a many cards being sold offer only a many cards of the obsolete GBS or 8066, and others to be just society by the sold of the obsolete GBS or 8066, and others to be just spoolly the pegineered. The SMI12 BREAKTHRU 286 to be just spoolly the pegineered the SMI12 BREAKTHRU 286 to be just spoolly the pegineered. The sold of the

speedup board manufactured today.
PCSG has since early 1983 dominated the lap portable market with ROM software such as Lucid spreadsheet and Write ROM that reviewers rated as excellent. We were prot to successfully enter the IBM PC market last year with disk access speedup software. Now we are so pleased with the BREAKTHRU speedup card. We use them on our own PC's to make them faster than AT's. We are really excited about this product.

PCSG makes the unabashed statement that the BREAKTHRU

286 card represents more advanced technology than boards by Orchid, Quadram, Victor, Mountain, P.C. Technologies, Phoenix . . we could go on.

Phoenix...we could go on. But an ad can't let you experience it for yourself. That's why we self the BREAKTHRU 286 on a 60 day trial. If you aren't completely assisted return it within 60 days for a full refund. It is priced at 5395. Call today with your MasterCard, Visa, American Express or COD instructions and we will ship your CIRCLE 489 ON READER SERVICE CARD card the very next day.



214-351-0564







#### ■ SMALL-FOOTPRINT PCs

Despite its Spartan looks, the system board includes all the circuity normally needed to operate a complete computer system, including a display adapter with both CCA-compatible RGB outputs (using an IBM-standard DB-9 connector) and composite video jack, an audio output, a floppy disk controller for twin double-sided, double-density (360K-byte) drives, a printer port, a light-pen connector, and two jovstick boots.

The monitor outputs of the 1000 SX

### ■ The Tandy 1000 SX's short expansion slots preclude the use of full-length boards.

will connect to any composite, standards RCBs, orenhanced graphics display, the last case, however, the monitor will have to operate in its CGA+compatible mode. As with the 1000 EX, its video output tended to make the on-screen image tended to make the on-screen image of the one of non-Tandy monitors. However, many Tandy displays (such as the CM-10) have front-panel height controls that take care of this eccentricity. (Tandy dealers of the two throw in a CCA monitor for the price of the row throw in a CCA monitor for the price of the prockage deals).

Tandy skimps on the printer port and leaves you with a circuit board edge instead of a full-fledged connector. You can buy an adapter that will enable you to plug in any PC-compatible parallel printer.

Drive A: is on the bottom of the standard-equipment stack of two floopy disk drives that fit into the 1000 SX's single drive bay. However, by pressing a function key during boot up, you can force the system to boot from the top drive.

The Tandy keyboard is both compelling and confounding. The touch is positive, with both audible and tactile feedback. The layout, however, goes in its own direction, a cross between the IBM enhanced arrangement and a vision that may have arisen during delirium tremens.

Twelve function keys stretch across the top row, but Alf has been deported to a hiding place between the alphanumeric and combined cursor/mumeric key pads, and the business of the conditional keysale—but only when Num-Lock is on. Shift keys are small, but there's also a dedicated inverted. "I cursor pad. Of course, you can learn to live with lift is we've learned to live with IBM's various attempts to drive us mad with its keyboard creations."

In an outstanding mistake in judgment, Tandy once equated the original Model 1000 with IBM's ill-flated PCp. The comparison might just hold up with the 1005 SX, too. But the 1000 SX is a better machine, allowing you full memory expansion on the system board and more speed while climinating most of the need for proprietary add-ons. Its major drawback is its short expansion slots that preclude the use of full-length boards.

Leading Edge Model D

Making a good thing better is a tough job, particularly when that good thing is al-

ready a market leader.
Leading Edge Hardware Products has succeeded in exactly that, however, boosting the performance of its top-selling Model D by 50 percent without changing its convenient and attractive package or its budget-pleasing price.

Inside and out, the new Model D mir-



Leading Edge Model D Leading Edge Hardware Products Inc. 225 Tumpike St. Canton, MA 02021 (000) 343-6833

Canton, MA (2021)
(2003) 343-483.
Lel Price Wild 512R RAM, two Boppy
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December 2012, with \$0-M

rors its forebear. Like the original, the new version is made in Korea by Daewo Tele-om, and its BIOS bears a Phoenix Compatibility Systems copyright. Like its predecessor, the new machine rates as a true small-footprint computer, standing rought by 16 inches square and 6 inches high. Is tough metal case is finished in pule gray being and features all the acconductments that made the original Model D such a good value.

Up front is a single drive buy that can contain and give front-panel access to two half-height devices. The factory supplies three different drive arrangements. The least-expensive model comes with one double-sided, double-density (360K) 5½inch floppy disk drive. Other models include a two-floppy version (the one reviewed here) and another equipped with a 20-megabyte hard disk in the bottom half of the drive buy.

Also adoming the front panel of the Model Dar an onvolf switch, a reset push button, and the keyboard connector. The rear panel has room for four expansion slot brackets, two power connectors (in and out), and a slot containing all of the computer's peripheral connectors—parallel and serial ports and monitor outputs—and two switches that control boot-up monitor tyce and CPU speed.

Even on the inside, the new Model D looks pretty much the same as its predecessor—only the microprocessor has been changed to protect your leisure time. The speed rating of the 8088 CPU chip has been upgraded, and so the Model D can now operate at the PC-standard clock speed of 4.77 MHz or at 7.16 MHz.

Changing the microprocessor speed is accomplished by flicking a toggle switch on the rear panel and requires rebooting the computer.

In PC Labs benchmark tests, the higher speed boosted the performance of the new Model D to 50 percent faster than a standard IBM PC. A socket is provided on the system board for an 8087 numeric co-processor.

Standard memory on the system board is 512K bytes contained in two parity-checked banks of since 256K-bit chips each. Another bank of sockets is provided so that you can add nine more 256K-bit chips and push system board memory to



The Leading Edge Model D was a pioneer small-footprint PC that offered good performance at a reasonable price. The new model is even better. Its dual-speed 8088 microprocessor boosts speeds to 50 percent faster than the IBM PC.

768K, of which only 640K is generally useful and accessible by DOS.

Installing the memory-expansion chips is more work than you'd think, however, because you'll have to remove the drive bay to gain access to the sockets hidden undemeath. Alternately, you can expand the memory of the Model D by using a standard expansion board.

Other circuitry on the system board includes the floppy disk drive controller, the serial and parallel ports, a time-of-day clock, and RGB color and graphics-capable TTL monochrome display adapters. Thus, in standard configuration, all four of the new Model D's full-length, 8-bit bus expansion sockets are available.

All ports use standard XT connectors—DB-9 connectors for the monitor outputs, female DB-25 for the parallel port, and male DB-25 for the serial port.

SETS TIME AUTOMATICALLY The system board clock will automatically set the time in DOS using a device driver that is loaded through the system's CON- FIG.SYS file. The lithium battery, which keeps this clock running when power to the computer is off, is soldered to the system board. That means a visit to your dealer or computer service shop when the battery finally wears out 2 to 3 years down the line.

Included as part of the Model D package are MS-DOS 3.1, GW-BASIC, Version 3.11, and a monochrome or color monitor.

The Model D received for evaluation was supplied with a Leading Edge monochrome display, a 12-inch (diagonally measured) monitor with a pale gray face and ambor phosphore. Compact and well-possess with a last brightness, contrast, and on/off controls (located under the right front edge of the screen) fall right to hand. A special wide foot near the rear of the display allows you to set the monitor's viewing amgle for your deskine height and optimize the contrast of the cont

mostly a cross between the original PC keyboard and a Selectric typewriter. The Shift keys are enlarged and Enter is L-shaped and labeled Return per Selectric practice, but function keys, the combined numeric/cursor keypad, Crit, Alt, and Esc are all in their standard PC places on special computer keys such as Backslash and Grave, have been moved farther from the typewriterlike area, and others have been somewhat changed in shape.

The feel is quite good, among the best IBM-compatible keyboards available, with genuine tactile and audible feedback. Once you get used to the modified layout, you should find it to be a finger-pleaser.

At \$1,295 (list price), the two floppy disk drive, monochrome Model D is reasonably priced, particularly considering its additional measure of performance. Once the typical dealer discount is factored in, the Model D should be a hard bargain to beat.

#### PC's Limited 286-8

Austin-based PC's Limited started out as an inexpensive mail-order alternative source of PC hardware and IBM-derived computers. Unusual among other PCs-by-post suppliers, PC's Limited actually designs and manufactures its own computers in Texas (although the company's first

FILE



PC's Limited 286-8 PC's Limited 1611 Headway Circle, Bldg. 3 Austin, TX 78754 (800) 426-5150 (800) 252-8336 (in Tex.)

monitor, \$2,595.

List Price: With 1 Mbyte RAM, one 1.2-Mbyte floppy disk drive, 51,995; with 20-Mbyte hard disk and monochrome monitor, \$1,795; with 30-Mbyte hard disk and monochrome monitor, \$2,195; with 20-Mbyte hard disk and EGAds! color monitor, \$2,195; with 30-Mbyte hard disk and EGAds! color

In Short: The 286-8 gets the high-end Editor's Choice nod. A better buy is hard to find, The unit is also available in 10-, 12-, and 16-MHz versions, all as either standard-size or small-footneint mechines.

CIPCLE 656 ON READER SERVICE CARD

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Our best-selling P351 dot matrix printer has a new front panel that puts the controls in easy reach.

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And if it's color graphics you need,

the P351C will turn a bright idea into a brilliant presentation. It gives you all the features of the P351 and puts high-resolution color graphics on paper for printed reports, or on transparencies for overhead projection.

All of which may explain why there are more Toshiba printers serving more businesses than any other 24-pin dot matrix printer in America3

To find out why your business should be using Toshiba printers call (800) 457-7777 for the Toshiba printer and computer dealer

near you.



CIRCLE 204 ON READER SERVICE CARD

#### ■ SMALL-FOOTPRINT PCs

products were repackaged OEM equip-

The 286-8 is the PC's Limited workhose, a middle-of-the-line machine that impersonates the AT but that adds a wealth of extras—including more memory and ports—all packed into a small-footprint case.

Based on the 80286 microprocessor, the 286-8 is a two-speed computer, switch-able between 6-and 8-MHz operation (both with one wait state) with a key press, even in the midst of applications or disk access. Other, more-expensive models in the

### ■ The PC's Limited 286-8 is an excellent low-cost alternative to the IBM AT.

PC's Limited line push the top speed to 16 MHz, with 10- and 12-MHz models also available. All come in small-footprint format.

An empty socket is available for an 80287 numeric coprocessor. Standard memory is 1 megabyte, all on

the system board, arrayed in four paritychecked banks of nine 250K-bit dynamic RAM chips each. A DIP switch allows memory to be split in different ways, including the most useful arrangement, devoting 640K to DOS and 384K to extended memory, in which it can function as a RAMdisk.

The BIOS bears a PC's Limited copyright and proved itself capable of running DOS 3.2 in PC Labs benchmark-testing. Neither an operating system nor BASIC is included with the machine, and no vacant ROM sockets are available.

Eight expansion slots are built into the 286-8, two using the XT-style 8-bit data bus and six with the AT-style 16-bit bus. All are full-length and tall enough to accommodate AT-height boards.

In the 286-8 standard configuration, one 16-bit expansion connector is taken up by a Western Digital combined floppy and hard disk controller, and the factory-sup-

#### Benchmark Tests: Small-Footprint PCs

Smalls looping IPC performance varies as widely as the features offered by these nine machines in the IBM PC-compatible class, the Leading Eggle Model B Stands out, with excellent read and write times and processing performance. The 80286-based machines are evenly matched, with not exceptions: Televiores StelCAT-286, which shows promise in the processing and rised and write results, but is hampined by a slow did not fail to strict in the source of the source o

#### Performance Times (Times given in seconds except where note

|                      | NOP   | 8886<br>Instruction<br>Mix | Conventional<br>Memory<br>(write) | Conventional<br>Memory<br>(reed) | Floating-<br>Point<br>Calculation |   |
|----------------------|-------|----------------------------|-----------------------------------|----------------------------------|-----------------------------------|---|
| IBM PC               | 10 10 | 32.03                      | 5 93                              | 5.93                             | 159 23                            |   |
| Tendy 1000 EX        | N/A*  | 32.01                      | N A <sup>1</sup>                  | N/A1                             | 172.93                            |   |
| Tandy 1000 SX        | 10 34 | 25 39                      | N/A <sup>1</sup>                  | N/A!                             | 131 45                            |   |
| Leading Edge Model D | 7.53  | 21 42                      | 4.07                              | 4 01                             | 105.06                            | , |
| Epson Equity 1       | NA*   | 32 19                      | N A <sup>1</sup>                  | N-A1                             | 160 11                            |   |

#### Performance Times (Times given in seconds except where it

| NOP  | 8086<br>Instruction<br>Mix           | Conventionel<br>Memory<br>(write)                         | Conventionel<br>Memory<br>(read) | Fineting-<br>Point<br>Celeviation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Disk Seel<br>(milli-<br>seconds) |
|------|--------------------------------------|-----------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 4.18 | 8 96                                 | 1.32                                                      | 1.31                             | 35 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 37.19                            |
| 4 18 | 8 95                                 | 1 32                                                      | 1.37                             | N/A <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 29 80                            |
| 4.17 | 8.95                                 | 1.27                                                      | 1.32                             | 35 48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 32.57                            |
| 4.23 | 9.34                                 | 1.37                                                      | 1.37                             | 36.52                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 39.14                            |
| 4.16 | 8 91                                 | 1.29                                                      | 1.29                             | 35.35                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 73.60                            |
| 4.17 | 8 90                                 | 1.31                                                      | 1.32                             | 35 48                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A5                             |
|      | 4.18<br>4.18<br>4.17<br>4.23<br>4.16 | NOP Mrs 4.18 8.96 4.18 8.95 4.17 8.95 4.23 9.34 4.16 8.91 | Instruction   Memory (write)     | NoP   Instruction   Memory   Memory |                                  |

The MOP benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in recorprocessors and the effect of mimory caching. This test executes almost nothing but NOP ("No Operation") mechanic code instructions in a big 1898 (loop).

The 8086 Instruction Mix benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

The Conventional Memory benchmark test allocates 256% bytes of conventional memory end irreds it as a scress of 64byte records. Then, 16,384 random records are read into enwritten from this memory.

The Floeting-Point Celculation benchmark lest measures processor speed by looping through a series of looking-point calculations, including multiplication, division, exponentiation, and logarithmic and argonometric functions. The benchmark program uses the looping-point library included with Microsoft C Compress C.

N'A'—Not applicable lest could not be booled up N'A!—Not applicable insufficient conventional memory to run test

Relative Times

plied parallel and serial ports also occupy an expansion card and slot.

Although the short card on which the port circuitry is located uses only the 8-bit bus, it was installed in a 16-bit slot. Of course, it can be relocated as necessary. Port connectors match the AT standard: a female DB-25 for the parallel port and a male DB-9 for the serial connection.

make DB-9 for the serial connection.

The single drive bay provides space for three half-height devices, but only the top two are accessible from the from panel.

The standard drive is a high-density (1.2magabyte) 5½-inch floppy disk. The evaluation machine was also equipped with an optional high-performance, 20-megabyte 3½-inch Winchester, adapted to the 5½inch form-factor bottom bus of the 286-8.

All drives mount with guide rails identical to those used in the Compaq Deskpro 286, which are slightly larger than those used in the IBM PC AT.

TRUNCATED AT The styling of the 286-8 most resembles a truncated AT: its case is squared off and a pale two-tone gray-beige with numerous vertical ventilation slots in the front panel. Near the upper left of the machine is a monitor panel adomed with a system key-lock, poweron, and disk-activity indicators.

PC's Limited augments the modes IBM arnagement with two additional displays that make its machines stand out from all the competition (including IBM). Called Smart Vy, the extra indicators include a four-segment alphanumeric display and a set of LED chase lights. The former gives an accurate readout of diagnostics during power up, duplicating the monitor display. The latter monitors system interrupts.

A display and adapter are not included in the 28-6 standard configuration. The evaluation unit reviewed for this article was equipped with a dual-mode color/monochrome graphics adapter and PC's Limited amber monochrome display, however. The display adapter is designed to imitate either a standard CGA to drive an RGB color display or all rerucles-syle monochrome graphics adapter to draw high-resolution monochrome graphics.

The optional PC's Limited monochrome display is quite compact, elevated on a built-in swivel base. The face of its

N/AF:—Not applicable: running the test caused the computer to lock up. N/AF—Not applicable: could not run without errors.

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|--------------------------|---|---|----|----|---|---|---|---|---|----|---|---|---|--|---|-----|
| ECH PC/286 PORTABLE      |   |   |    |    |   |   |   |   |   |    |   |   |   |  | ä | 51: |
| Options:                 |   |   |    |    |   |   |   |   |   |    |   |   |   |  |   |     |
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| nternal Hayes Compatible | 6 | N | 94 | 31 | 1 | 3 | n | 8 | E | ıc | 3 |   |   |  |   |     |
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| Mono/Graphics Card                          | 1179 |
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#### PCS THAT WON'T CRAMP YOUR STYLE

Syelte new machines

challenge the old space invaders by freeing up desk space without sacrificing power.

Surface-mount technology and VLSI (very large scale integration) have helped reduce the size of today's PC by 30 percent. A new class of computer takes this downsizing one step further, by building the chassis vertically instead of horizontally, and in some cases saving space by lopping off disk drive bays and expansion slots.

These compact computers run the gamut from bare-bones PC-compatible models like the Tandy 1000 EX and the Epson Equity 1, which both share small retail prices at under \$1,000, to full-featured AT compatibles like the Olivetti M28, the HP Vectra, and the PC's Limited 286-8

The system units of the nine compact computers reviewed in this issue were placed within the outline of an IBM PC AT CPU and photographed to show the differences in size.

These PCs carry on a tradition started by the Sperry PC/microIT, the AT&T 6300 Plus, and the ITT XTRA XP. (See sidebar "Space Saver Updates" for recapped reviews of these machines.)







EPSON EQUITY I







The PC's Limited 280-8 sports three half-height drive bays and eight full-length AT slots, enough for even the most power-hungry PC user. One interesting extra: Smart Vu alphanumeric and LED indicators that give readoust of system diagnostics.

tube is medium gray and treated with an antiglare substance.

The standard keyboard conforms exactby to the original AT keyboard layout with function keys on the left, enlarged Shift and Enter keys, and indicators above the combined numericleuron keypad at the right side. The touch is very good, with a positive overcenter feel but no audible feedback. It makes for very satisfactory typing.

Although the 286-8 demonstrated no bad habits and proved completely workable right from its box, PC's Limited quality control could be more stringent. Case in 
point: on the Smart Vu panel. the diskentity LED did not function properly—itentained dark no matter what went on 
insize the computer. In based, the power-notspeed indicator flashed with disk activity 
while also priying to indicate PCP speeds.
While also priying to indicate PCP useds.

Outside of the Smart Vu malfunction.

Outside of the Smart Vu malfunction.

the PC's Limited 286-8 appeared well ry. Tandy/Radio Shack's 3000 HL

made and essentially quirk-free. The Smart Vu panel (when it's working proprty) should help allay any fears of buying mail order and make telephone support less a natter of guesswork. The 286-8 litdef is better integrated than most mail-order products, and having proven itself a solid and reliable performer, it is an excellent low-cost (and compact) alternative to the IBM AT.

#### Tandy 3000 HL

Externally, the small-footprint Tandy 3000 HL is bland enough to blend into any office decor. It has perhaps the plainestlooking case of any AT-compatible computer: the front panel is decorated only with a square red reset button, a green power-on-LED, and no provision for a system lock. The back reveals little more than the expansion slots, a parallel port, and the keyboard connector. Inside the mechine: it's a different stoachieves a good performance and a high measure of AT compatibility through use of the Chips and Technologies AT CHIP-Set and an 80286 microprocessor running at either 4 or 8 MHz with one wait state.

Compatibility is further enhanced by the system BIOS, which bears a Phoenix copyright. At top speed, the 3000 HL's performance is exactly on par with an 8-MHz IBM AT.

The system is designed to run under MS-DOS 3.2 (which is not included). In PC Labs benchmark tests, it would not operate under PC-DOS 3.2.

Standard memory is 512K in two pari-

y-checked banks of nine 256K-bit dynamic ic RAM chips each. Six additional sockes are provided for fleshing out system RAM to the 64K-byte DOS limit (presumably), using a combination of 4 by 64K and 15 64K dynamic RAM chips. The unusual configuration and somewhat out-of-the-ordinary chips seem like clever subterfuge to ture you back into your local Radio Shack store when expansion time rolls around.

Also built into the system board is a single parallel printer port that uses an IBMstyle female DB-25 connector. A socket is for an optional 80287 numeric coprocessor. There are no extra ROM sockets.

The 3000 HL, like the IBM AT, uses CMOS memory to store system setup information and keeps this memory, as well as a built-in time-of-day clock, alive with a lithium battery that s' attached to the inside of the case with a strip of Velcro.

The system unit contains seven fulllength and AT-height expansion slots.



Tandy, 3000 HL.
Tandy, Padio Shuck
1700 One Tandy Center
Fort Worth, TX 76102
(817) 309-3300
Latt Price: Winf 512K RAM, one Boppy
disk drive, 31.099; internal 21-Mbyte cartidge system, 31.799; curvidge, 854,
Requires: DOS, display, and susper.
Boster: Tandy smill AT compatible of
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PROBLEM: The more experience your hard disk has, the harder it has to work.

# THE SOFTLOGIC SOLUTION: Disk Optimizer

Your hard disk will run faster when it's not chasing around after files.

Remember the old days when your hard drive was new? Remember that smooth, fast, slick performance? Those quick retrievals, rapid saves, lightning-like database sorts? Well ever since, DOS has been doing its est to slow your hard drive down. Not by slowing down the motor, but by breaking your files up into pieces. Storing different chunks in differe places. Data files, programs, over-lays and batches that started out

in one seamless piece are now scattered all over Loading is slower orting is slower. Retrieving, backing-up.

Everything takes longer becau your disk has to work harder. Problem is, it's something that happens so radually you may not notice the difference. At least, not until you see the dramatic improvement after using Disk Optimizer.

File fragmentation-lt's a problem you can see.

Watch your hard drive the next time it reads or writes a file. Each "blip" of the LED means the drive-head is moving to another place on the disk—either to pick up or lay

down another chunk of data. And the truth is, head movement takes ne. Far more time than actual reading and writing. What's worse, all this head movement causes extra wear and tear that can

Disk Optimizer—Tunes up your disk by cleaning up your files.

shorten the life of your drive.

Disk Optimizer works by finding all the scattered pieces of your files and putting them back together where they belong. Next time your drive reads it, there's just one place And the results are often

dramatic. Reading and writing times may be cut by as much as two thirds. Database sorts that used to take hundreds of head moves now proceed quickly and efficiently. And since head movement is now at an absolute minimum, your disk drive will lead a longer, more productive life.

Analyze, scrutinize, optimize.

Before you optimize, you'll probably want to analyze. So Disk Optimizer shows you, in percentages, how much ftagmentation has taken place-on the entire disk, in individual

directories, or for groups of files you specify using global or wildcard names. Plus, there's built-in data security that lets you assign

esswords to as many files or file groups as you want. And the File Peeker gives you an inside look at the structure of files. It's a great way for non-programmers to learn more about computers and a powerful tool for

professionals who want to analyze the contents of their

Get your hard disk back in shape-with new improved Version 2.0

Hard to believe, but new Disk Optimizet Version 2.0 is even better than before. Not only will it optimize your disks in far less time than it used to, but it actually speeds up tetrievals even more by letting you give priority treat-ment to your most used files, like programs and batches

When you think about it, it's simple. The longer you own your hard drive, the nore you come to depend on it. But the longer you wait to get Disk Optimizer, the

less performance you'll get.
Use it just once and discover what thousands of satisfied PC users already know— \$59.95° is a small price to pay to restore

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#### ☐ Small-Footprint PCs: Summary of Features

|                                                                | Rece    | dime   | lystem ur<br>naions (ir | ill<br>sches) | Misro.    | Expansion              | Second                                                                  | Keyboard          | Seriei      | Parallel    |
|----------------------------------------------------------------|---------|--------|-------------------------|---------------|-----------|------------------------|-------------------------------------------------------------------------|-------------------|-------------|-------------|
| Product/Manufacturer                                           | price   | Height | Width                   | Depth         | processor | siots                  | (MHz)                                                                   | style             | ports       | ports       |
| Tandy 1000 EX<br>Tandy Radio Shack                             | \$599   | 3.4    | 17                      | 13            | 8088      | None                   | 4.77 and<br>7.16                                                        | Proprietary       | •           | (optional)  |
| Epson Equity I<br>Epson America Inc.                           | \$795   | 5.75   | 14.5                    | 14            | 8088      | 3                      | 4.77                                                                    | Original AT       | •           | •           |
| Tendy 1000 SX<br>Tandy Radio Shack                             | \$999   | 5      | 16                      | 13            | 8088-2    | 5                      | 4.77 and<br>7.16                                                        | Proprietary       | •           | ●(optional) |
| Leading Edge Model D<br>Leading Edga Hardware<br>Products Inc. | \$1,295 | 5.5    | 14                      | 15            | 8088-2    | 4                      | 4.77 and<br>7.16                                                        | XT                | •           | •           |
| PC's Limited, 286'8<br>PC's Limited                            | \$1,495 | 6.5    | 16.5                    | 16.5          | 80286     | 6                      | 6                                                                       | Original AT       | •           | •           |
| Tandy 3000 HL<br>Tandy/Radio Shack                             | \$1,699 | 6.5    | 17                      | 15.5          | 80286     | 7                      | 4 and 6                                                                 | Original AT       | ●(optional) | •           |
| Sperry PC/micro IT<br>Sperry Corp.                             | \$2,345 | 5      | 15                      | 15            | 80286     | 5                      | 6 and 6 with<br>one wait<br>state; 7.16<br>and 6 with<br>no wait states | XT and AT options | •           | •           |
| ITT XTRA XP<br>ITT Information Systems                         | \$2,995 | 5      | 14                      | 16            | 80286     | 5                      | 6                                                                       | XT                | •           | •           |
| TeleCAT-286<br>TeleVideo Systems Inc.                          | \$2,995 | 6.25   | 16                      | 16.5          | 80286     | 5                      | 6 and 8                                                                 | Original AT       | •           | •           |
| HP Vectra<br>Hewlett-Packard Co.                               | \$3,099 | 6.3    | 16.7                    | 15.4          | 80286     | 7                      | 8                                                                       | Original AT       | •           | •           |
| AT&T 6300 Plua<br>AT&T                                         | \$3,675 | 6.5    | 15                      | 17            | 80286     | 6 (7 PC<br>compatible) | 6                                                                       | XT                | •           | •           |
| Olivetti M28<br>Olivetti USA                                   | \$5,420 | 7      | 16                      | 16            | 80286     | 7                      | 6                                                                       | Original AT       | •           | •           |

-Indicates Editor's Choice. -Yes O-No

The downsizing that makes small-footprint computers possible can be accomplished in a variety of ways. Most obvious from this features table are th

Three of these use the XT-style 8-bit data bus, and the remaining four use the full AT-style 16-bit bus.

In typical modern fashion, the 3000 HL shaves off several inches by guillotining one drive bay from the basic AT design. The remaining bay will hold up to three half-height devices and give all of them front-panel access. Tandy does not follow the AT mounting scheme, however, and instead screws the top drive directly into the sides of the chassis. The lower drives use a separate pair of screw-in brackets for mounting purposes.

Standard equipment here is a single double-sided, double-density (360K-byte) floppy disk drive. Among the drive options is the internal 51/4-inch, 21-megabyte cartridge disk system manufactured by Iomega Com.

## The Tandy 3000 HL shaves off several inches by guillotining one drive bay from the basic design.

Essentially this drive is a miniaturized Bernoulli Box, scaled to fit a standard halfheight drive slot with no reduction in capacity. For a removable media system, its

performance is very good-in the area of 45- to 50-millisecond average access time (its true average access time could not be measured by PC Labs benchmark test because the system creates its own BIOS routines that are incompatible with the tests), almost up to the AT hard disk standard. Its rate of data transfer is handicapped by the use of an 8-bit host interface, however.

The little Bernoulli cartridges-each about the size of a stack of six ordinary floppy disks-are a vast improvement over the huge, clipboard-size monsters that Iomega claimed were so easy to pack

in a briefcase

The almost crashproof nature of the Bernoulli system included in the 3000 HL makes it a top choice if you live in an area prone to earthquakes or on-board a ship or anywhere else physical shock and abuse may be sustained. (Some sarcasm seems appropriate because, although a very good product, the disk subsystem costs more than the computer it's installed in and the



PROBLEM: Handling your need for more megabytes, without spending megabucks on a new drive.

## THE SOFTLOGIC SOLUTION: Cubit™

Now get up to twice the capacity from all your storage media.

You know what happens. The more you use your computer, the more information you create. And the faster you fill up your disk.

The IOMB drive that once seemed enormous is now jammed with important files. That 20MB that should have

lasted years is crowded in a matter of months. Of course you could keep buying bigger hard drives. Or you could get Cubit and get the maximum storage

space from the drives you already have. Where is Cubie?

What is Cubit?

In brief, Cubit is an advanced software tool that automatically reduces the number of bytes required to store a file, then converts the file back to its original size when retrieved.

Some programmers call this effect "data compression," others, "disk expansion," Either

way, the result is the same.
Here's how it works. When Cubit compresses a file, it first compares each word to its massive English word dictionary. Words that match are reduced to a predetermined code of just one, two or three bytes each. It then saves the abbreviated version to disk. Decompress the sabreviated version to disk. Decompress

sion works just the opposite.

To accommodate other words and symbols, Cubit uses two more compression techniques. One assigns new, shorter codes to unusual words. Another compresses according to the frequency of character strings in non-text data.

So no matter what kind of files you create, Cubit ensures maximum space savings. Best of all, you'll be using the same fast, reliable data compression techniques used on mainframe computers for decades. How much disk space will you save? Because the vast majority of data created on PC's is standard ASCII text—letters, numbers and other English

language symbols—we've optimized Cubit for word processing and database files. With these, you'll get a minimum of 50% expansion on up to a full 100% or more. At the same time, you can expect a significant 30% to 50% improvement with

other kinds of data. Including spreadsheet files, program code, graph and image files, even binary data.

And Cubit works just as well with floppies and tape cassettes as it

does with hard disk drives.

#### Run Cubit where you want, when you want.

Maybe you'll want to use Cubit for all your files, or maybe just some. So Cubit lets you specify exactly which files to work on and which ones to leave alone. In RAM resident mode, Cubit works quickly and

invisibly, compressing and decompressing right from within any program you run. Or use Cubit's powerful file management mode. It supports wild-card and global file names, and addresses sub-directories up to thirty levels deep.

## Save time and money, as well as disk space.

A compressed file is a smaller file. So with Cubit, back-ups take less time, as well as less space. And communicating compressed files means significant savings on phone line charges. Any way you look at it, Cubit will pay for itself in no time.

#### So why buy a bigger drive when you can have smaller files?

Cubit is already saving time, trouble and money for thousands of PC users nationwide—by giving them up to twice the storage capacity from all their magnetic media. And all for just \$49.95"—a mere fraction of the cost and bother that come with a bigger hard drive.

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The Tondy 3000 HL's narrow width belies its seven full-length AT-height expansion slots; three 8bit and four 16-bit. Space is soved by including only one drive bay, which is copable of holding up to three half-height devices.

same capacity is available in ordinary hard disks at one-quarter the price.)

The 3000 HL keyboard is patterned after the original AT design and uses exactly the same layout. Only the indicators of the locking Shift keys have been moved into the key caps themselves. The keys require medium pressure to activate and have alinear, feedback-free feel. It's eminently workable but hardly a wonder.

As a bare-bones AT compatible that's available in a local store instead of through mail-order ask, the 3000 HL. offers a very good value. If you're too uncertain of your computing abilities to go it alone—without a nearby dealer to fall back on—and you're on a tight budget, you would do well to consider the Tandy 3000 HL.

#### TeleCAT-286

The TeleCAT-286 was the first of the small-footprint AT compatibles and a trendsetting product from TeleVideo Systems, a major supplier of video-display terminals. It was downsized from the IBM AT in every way but performance by slicing off most of the internal hard disk drive bay and expunging three expansion slots. The result was a compact and competitive computer in a case that's only 61/4 by 16 by 16/5 inches

Alas, in the year and a half since the introduction of the TeleCAT, the rest of the



TeleCAT-286 TeleVideo Systems Inc. 1170 Morse Ave.

1170 Monse Ave. P.O. Box 3568 Sunnyvale, CA 94088 List Price: With 512K RAM, high-resolution monitor, 1.2-Mbyte floppy disk drive,

tion monitor. 1.2-Mbyte floppy disk drive, 20-Mbyte hard disk, 52.995; with 30-Mbyte hard disk, 53.995. In Short: The TeleCAT-286 is a well-made, small-footprint, 8-MHz AT compatible with a semicompatible proprietury high-resolution

display system.
OROLE 650 ON READER SERVICE CARD

industry (with the exception of IBM) has caught up, and the product has lost some of its luster.

Based on an Intel 80286 microprocessor running at 8 MHz, which can be slowed to 6 MHz using a rear-panel switch, the Korean-made Tele-CAT is fully AT compatible and runs MS-DOS 31, supplied optionally by Tele Video. Its ROM BIOS, which bears a recent (October 1986) copyright, accommodate IBM's finitely PC-DOS 3.2 without a

A socket is provided for an optional 80287 numeric coprocessor, and there are two vacant ROM sockets. Coprocessor speed is jumper-selectable to either 4 (at 6-MHz CPU speed), 4.77, or 5.33 (at 8-MHz CPU speed) MHz.

Of the five full-length and AT-height expansion slots, four use the AT-style 16bit expansion bus—one of these being filled with a combined floppy and hard disk controller. The remaining slot uses the 8-bit XT design and is devoted to the display adapter.

Standard memory is 512K in two pairty-checked bracks of nine 256K-6h dynamic RAM chips mounted in seckets on the system board. Two more banks of sockets are provided for system-board memory capansion. These can be filled with either 64K- or 256K-bit chips, yielding a total on-board memory capacity of 640K you or 1 megabyte, respectively. Unfortunatishth, adding chips have been such as allth, challenge because the sockets are hidden under the floopy disk drive bay.

A serial port and a parallel port are built into the system board. Both use AT-style connectors—a female DB-25 for the parallel port and a male DB-9 for the serial, and system board jumpers allow them to be set to different DOS designations (for instance, COMI or COM2).

UNUSUAL HARD DISK BAY Perhaps the most unusual design option of the Tele-CAT is its internal half-height hard disk bay that puts the drive on edge to the right of the floppy disk bay. Two sizes of hard disk are available—mornially 20 and 30 megabytes when formatted under DOS.

The 20-megabyte drive in the evaluation unit, a Seagate ST-225 that is standard equipment, proved to be the system's big-



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The TeleCAT power supply is large but bears no rating. Its fan is one of the noisiest I have encountered. A spare power connector is provided for one additional disk device.

TeleVideo allows several monitor options. The review unit was equipped with a standard TeleVideo high-resolution monochrome display and adapter. The TeleVideo display is quite different from the standard IBM green screen. Its phosphors are short persistence and show little or no lag, and the character font is the same sans serif design used on TeleVideo terminals (in-

stead of IBM's serifed choice).

The TeleVideo design also varies from

through its single video cable. Thus, other manufacturers' displays will not be compatible with this TeleV sideo mode Callation colors, are available that are compatible. In fact, plugging another monitor—or plugging the TeleVideo display in with the wrong display adapter settings—can result in equipment durange. (A warning in the manual alters the user to this hazard.) The TeleVideo monochrome display allows up to 16 shades of gray (welf, green), and proved compatible in PC Labs monochrome EGA benchmark.

The monitor has a dark bezel and a swivel stand with a footprint just smaller than that of the TeleCAT system unit. A single-intensity control is available. The dark, antiglare treated display and rectangular design of the monitor gives the impression of one of the great Easter Island stone faces.

The TeleVideo keyboard, made in Thailand, uses the original AT layout, with enlarged Enter and Shift keys, ten

function keys at the left, and a combined numeric/cursor pad on the right. The touch is progressive and light but provides no audible or tactile overcenter feedback.

Unlike other computers in its category, the TeleCAT does not have a front-panel drive-activity indicator or system unit key lock, though a filled-in front panel cutout hints at the design intent.

The system is set up through software, as with the IBM AT. Unlike IBM, TeleVideo includes a low-level hard disk formating program with DOS. A lithium battery, which keeps the CMOS configuration memory alive and runs a built-in time-of-day clock when the system is switched off,

is stock to the casing with Velcro. Compared to oday's 10- and 12-MHz. speed demons, the 8-MHz TeleCAT-286 with its slow hard disk rates offers with its slow hard disk rates offers problem of the most offer of the most robust and best-built machines I've contented (although, strangely; it bears the less stringen PCC Class A rating—which means it is certified for home but not inmeans it is certified for home but not intis quality construction and compact size rather than performance.

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One example of HP's unique design approach is the TouchScreen II, a truly tiny system with a drive chassis that's the same size as the combined computer and display designed to sit atop it. Alas, although HP gave the machine an 808 micropocessor and MS-DOS to run, the company neglecel to design IBM PC program or hardware compatibility into the TouchScreen II. The HP Vertra, however, is a bit's trun-

about for Hewlett-Packard. In fact, when you turn it on, you just might be able to faintly hear the gulp of HP swallowing its



TeleVideo Systems' TeleCAT-286 was the first small-footprint AT compatible, and it's still one of the sleekest. Its route to slimness: slicing off three expansion slots and most of the internal hard disk bay. The machine's standard high-resolution monitor is one of its most attractive features.



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#### SIDESTEPPING THE DESKTOP DILEMMA

If your PC takes up too much room on your desk and the Info Center laughs when you ask for a smaller-footprint machine, create your own small-footprint PC the easy way: turn your existing machine on its side and stick it on the floor next to your desk.

next is your desk. the computer America. the computer In corporate America, the computer of choice, is the 30-by 60-inch office desk with a 20-inch deep by 36-inch typing return. There's no way you can fit a PCI (to 17 inches deep) and a keyboard (8 inches deep) on a 20-inch-deep surface of the computer of the comput

29- to 30-inch-high desk.) If you put your PC on its side next to the desk, the three cables from your PC to the monitor and keyboard will come up short. If you have a mouse, its cable probably will be short, too. To remedy the problem, invest in a set of extension cables for \$40 to \$75, such as the one available from Curtis Manufacturing (305 Union St., Peterborough, NH 03458; (603) 924-3823). Different cable sets handle IBM monochrome, IBM color, Compaq, and non-IBM monitors. Why don't manufacturers build monitors with longer cables? A good question with a simple answer: they don't want hassles with the FCC. The longer the signal cable, the bigger the problem with emis-



Turn your big-foot PC into a small-footprint machine—just turn it on end and hide your keyboard under the monitor.

sions. A short, 3-foot cable means easy FCC approval. Since no one builds monitors with longer cables, there's no competitive disadvantage in pushing the problem off to the user.

To live comfortably with the office desk and typing return, you'll also need a keyboard drawer, about \$100, such as the Hitle-A-Board from Posting Equipment Co. (752 Military Rd., Buffalo, NY 14216; (716) 877-2849). The monitor rests on top of the drawer, and the keyboard rolls out when you need it. (If

you put your PC on top of the keyboard drawer and the monitor on top of the PC, you may find that the monitor is sitting too high for comfortable use. But some people, especially those with bifocals, may find it just dandy.)

You'll also probably want a system stand that costs anywhere from \$30 for a U-shaped saddle to \$132 for IBM's deluxe full-system AT enclosure. Actually, most PCs rest on their sides adequately without stands, especially if braced against the wall or side of a desk.

There's no harm done to the disk drives or hard disk from standing a PC on its side, as long as the fan (near the power switch) is on the top end to suck out the rising hot air.

Curtis Manufacturing and Computer Accessories (6610 Nancy Ridge Rd., San Diego, CA 92121; (619) 457-5500 or are among the best known of a flood of companies accessorizing Americanmade PCs. They and others make remote on/off switches and even extension arms to swivel your monitor out of the way when it's not needed, much like the tool tray in your dentity's office.

If your local computer shop doesn't have the accessories, check with one of the mail-order catalog suppliers such as Misco (Den Misco Plaza, Holmdel, NJ 07733; (800)631-2227), Inmac (2465 Augustine Dr., Sarate Clara, CA 95059), or Moore Computer Supplies and Forms (P. O. Box 20, Wheeling, IL 60090; (800) 323-6230) —Bill Howard.

collective pride. Rather than breaking new ground and trudging into somewhat obscure territory, the Vectra is an unabashed AT clone squeezed into a small-footprint package.

package.
Its microprocessor is an 80286 operating at 8 MHz with one wait state. The standard operating system is MS-DOS 3.1, but
the machine tested here had no problem
running DOS 3.2. The Vectra's expansion

slots follow the AT standard—two using an 8-bit data bus and five a full 16 bits wide, all of them of full length and AT height.

The smaller footprint of the Vectra was achieved by lopping off one drive bay rather than by miniaturizing circuits. In fact, the system board is not large enough to contain all of the system's circuitry, so HP has added a special auxiliary board (which

does not consume an expansion slot) to hold the RAM memory.

The Vectra is available with either 256k or 640k bytes of RAM factory installed. The smaller model has sockets for add-on chips; in the larger model all the chips are soldered. The memory arrangement is somewhat unusual, divided into 128K-byte banks of six chips each: four 4 by 64K-bit and two 1 by 64K-bit, the latter



used for parity checking. Although all chips are off-the-shelf components, the 4-bit-wide chips may be more difficult to find (and thus more expensive) than the single-bit-width 64- and 256K-bit chips most other compatibles use.

With noon for three half-height access, the Vettin have front-papel access, the Vettin's drive bay provides serveral mass-storage options. The least-expensive Vectra is equipped with one double-sided, double-de-nisty (360K), 5½-inch floppy disk drive. As you go up the price scale, mass storage increases to 1.2 megabytes. Pay more and you can get an additional half-beight HP 20-megabyte additional half-beight HP 20-megabyte equipped with a high-performance, full-height Seatest 40-megabyte and the price of th

The evaluation unit was equipped with the top-of-the-line drive, which matched the performance of the system quite well

and gave a smooth feel to its operation.

The floppy disk control circuitry is built into the Vectra system board. The hard disk controller requires one 16-bit expansion slot.

All drives mount on rails, much as do AT-drives, but the mounting rails are of a proprietary design and are about %-inch thick.

For the most part, the rest of the Vectra chassis is entirely conventional. Novel de-



The HP Vectra achieves its small footprint by removing one drive bay rather than by miniaturiting circuits. There is a wide range of storage options available, from a single floppy disk drive up to a 40-megabyte hard disk.

sign touches include a front-panel pushbutton on/off switch (connected to the power supply at the rear of the chassis by a long, Z-shaped plastic arm) and a system key lock that's supplied as a user-installed option.

As with most AT compatibles, the Vectra stores system setup information in CMOS memory and has a built-in time-ofday clock. Both memory and clock are powered by a lithium battery. The battery is mounted more securely than most in its own internal plastic holder.

GREAT KEYBOARD The Vectra keyboard is pure pleasure. Its layout seems to be a hybrid of the original AT standard (enlarged Shift and Enter keys, left-hand function keys, right-hand combined cursor and numeric key paid also the IBM on the original and the IBM on the original state of the keysads and an additional set of top-tom, function keys—but only eight of the Backstah, Crit, Alt, Esc., and PriSc are all in their original AT locations.

The key action is light but has a genuine positive-over-center feel. Although mechanically quiet, the system emits a faint simulated key click as audible feedback. Typing angle is adjusted by a full-length bar that runs along the bottom of the rear of the keyboard.

Unfortunately, the HP keyboard uses different connectors from the IBM product and is thus not directly hardware compatible. If it were, HP might not get this one

back. HP offers several display options. Included with the evaluation unit was an ECA system that follows the IBM standard and executed PC Labs EGA benchmark tests flawlessly. The IPP monitor isself is stylishly square with an antiigan-treated back-face I4-inch (diagonal) screen that's both shape and bright. Other income of the contract of the contract contract on its package) and a combined excited on its package) and a contract excited on its package and a contract excited on its package. and 25-pin female parallel connectors.

The Vectra is both a usable and likable computer with performance exactly on a par with the 8-MHz AT. It's the first machine that combines HP's top-quality reputation with enough compatibility to make it generally accessible. Workmanship and overall quality is up to—but not beyond—the current industry standards.

Most importantly, the Vectra moves HP into the mainstream of personal computer technology—and, undoubtedly, will make the true believers say something like, "I told you all along that HP made good computers."

#### Olivetti M28

From the land of Michaelangel oyou might expect a computer that looks like a block of marble waiting to be hewn and that's exactly what you get in the guise of the Olivetti M28. A helty block of gray that makes up for its small foreignt with skyscraperilike helght (7 by 16 by 16 inches). It has made to the small recognition with skystrongly resembles the more familiar strongly resembles the more familiar other Olivetti modelb but is somewhat taller and thus able to accommodate an additional half-height drive.

The M28 achieves its compatibility and AT-speed with an 80286 microprocessor that runs at 8 MHz with one wait state. The preferred operating system is MS-DOS 3.1, though PC-DOS 3.2 ran fine during



RAM, monitor, and keyboard, \$5,420. Options include hard disk drives between 40 and 70 M bytes and an extended graphics board. In Short: The hardy Olivetti M28 offers space for three half-height devices and seven full-length expansion slots inside a sleekly styled box. ORICE 465 ON PEACE SERVICE CARD P Constant of the Constant of

The striking Oliveti M28 is very toll and resembles the AT&T 6300 Plus, though its height allows for one extra half-height drive. Its small footprint is achieved by the removal of the internal hard disk bay.

PC Labs benchmark testing. Shrinking the M28's for

Shrinking the M28's footprint was a simple matter of eliminating the AT's internal hard disk drive bay. What's left is a single bay that will accommodate three half-beight devices, two with front-panel

Standard equipment here is a high-density (1.2-megabyte) 5½-inch floppy disk drive and a 20-megabyte half-height Olivetti-manufactured drive that turned in an AT-rated performance with an average access time of about 40 milliseconds. Fortyand 70-megabyte hard disks are also avail-

able.

Seven full-length expansion slots are provided inside the M28, including three equipped with the XT-style 8-bit data bus and four with the full AT 16-bit bus. In the evaluation unit, two flow 18-bit slots were filled—one with a full-length floppy disk controller and one with part of the display adapter. (An additional eard for the display adapter is semipermanently mounted in a proprietary expansion slot to the left of the

other seven.) One 16-bit slot was also filled with a hard disk controller based on the Western Digital chip set.

As with earlier Olivetti and Olivettibased PCs, the M28 uses a separate expansion connector board and system board. When you remove the top of the case, only the expansion slots and some heavy gauge wiring that looks left over from Dr. Frankenstein's experiments are visible.

HIGE CIRCUIT BOARD The rest of the circuity of the M28 is hidden madeneath the machine on a huge circuit board that extends over the entire length and width of the case. The board is decorated with 512K byes of RAM in two mine-chip parity-checked banks of 256K-bit chips soldered to the board and an equal mainter of sockets for memory expansion, a socket work of the case of

he Part of the glass epoxy real estate is de-

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CHOICE The Cambridge Spreadsheet est is vasily superior to both ocuCalc and The Spreadsheet Auditor and will leave you monrong how you ever spread a skeet systhesis it. The program's ability to hip right into your spreadsheet at any time makes the analysis process

oth and intuitive. Serious 1-2-3 totil find its features-such as Scan, which zeros in on common but hard-to-spot logic errors— undispensable.

EDITOR'S

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#### ■ SMALL-FOOTPRINT PCs

#### FEDITOR'S CHOICE

#### · Leading Edge Model D PC's Limited 286-8

Sperry Corp.'s PC/microIT vornered Editor's Choice last year for its remarkable compactness and overall design. While it's still o good machine, the competitors reviewed here have muscled in on the PC/microff's territory, and some of them

have beoten it of its own game. The least expensive of the machines reviewed here that do not socrifice performance ond exponsion space for o smaller footprint is Epson Americo's Equity 1. For rock-bottom bung for the buck, the Epson gets an honorable mention. But for only \$100 more, the new Leading Edge Model D offers another expansion slot, a monitor, and 50 percent more speed, making it our low-end choice among small-

footprint PCs Move up to AT performance and you'll find that speed and features are unusually well matched among the small-footprint 80286-based machines examined here. Because oll have the AT compatibility we demond along with 8-MHz AT performance, price would be the most important factor in the buying decision. As the lowest cost machine at its performance level, the PC's Limited 286-8 wins our nod-both as best buy omong these AT compatibles ond as the overoll winner in terms of performance and features per dollor.

voted to a serial port and a parallel port. both of which use XT-style 25-pin connectors. A wealth of jumpers allows you to configure the system memory and assign DOS names to the ports. You can add etther 64K-bit chips and stretch RAM to the DOS maximum of 640K or add 256K-bit chips and devote the excess above the DOS limit to extended memory.

The front panel of the M28 includes a

volume control for the internal noisemaker/speaker, a green power-on LED, yellow drive-activity and system-locked indicators, a key lock button, and a recessed reset button. The power switch is conveniently tucked in the front right corner of the machine.

The Olivetti high-resolution monitor (a \$750 option) is quite large for the size of the screen-a great big gray housing for a little 12-inch (diagonally measured) screen. The mammoth monitor stands on an equally massive swivel/pedestal.

Its on-screen characters are sharp but small. Although the color characters are as detailed as those on an EGA display, the Olivetti display is not compatible with EGA graphics-running the PC Labs display benchmark tests sent the system into oblivion and made the front-panel reset button a real asset.

Furthermore, the monitor received for evaluation appeared somewhat defective in that its intensity could not be reduced sufficiently to make the background truly black and hide the retrace lines.

The Olivetti keyboard wanders off in its own direction. Its layout roughly corresponds to that of the original AT product but shifts things around just enough to be interesting-and frustrating at that if you're used to anyone else's keyboard. Alt and CansLock abut the Spacebar, and the Enter key has moved down one position (and shrunk) to make room for PrtSc. As a result, many of your right-hand shifts turn into carriage returns until you get used to the placement.

The action is both light and positive with a definite mechanical feel and key click. Key travel feels shorter than that of most keyboards, and the tops of the keys are fully cupped (instead of having a single axis of curvature, as in the IBM design), Yellow LEDs indicate the status of Shift keys, and a panel of wallpaper (or some such nonsense) decorates the area above

the keys where IBM puts a pencil rail. The great gray box of the Olivetti M28 will prove to be a hardy desktop worker. but its nonstandard display system makes it a chancy choice if you plan on dealing with high-resolution graphics.

Winn L. Rosch is a contributing editor of PC Magazine.

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If you've run out of slots in your PC or can't yet justify the expense of an expanded memory board for the occasional large spreadsheet, there's an alternative you shouldn't overlook: low-cost

n alternative you snoulan't overlook: low-co: ''expanded memory emulator'' programs.



# EMULATING EXPANDED MEMORY:

# Five Software Alternatives

6 6 Memory full."
Now you've done it.

Y You've created a 1-2-3 spreadsheet that's too big. Bad news: the spreadsheet won't fit, it can't be done any other way, and in has to be done by Friday. Well, it looks like the time has come to get the bucks together to go out and buy an expanded memory board. As you know from having read "Enlarging the Dimessions of Memory." VP. Magazine. Yel-

get the bucks together to go out and buy an expanded memory board. As you know from having read "Enlarging the Dimensions of Memory" (Fr. Magazine, Vielume 5 Number 1) and "More Options for Enlarging the Dimensions of Memory" (FC Magazine, Volume 5 Number 11), you have plenty of choices on which to spend your money. But wait a minute. You now have another less expensive alternative.

The five low-cost "sexpanded memory cumulator" programs reviewed in this article can emulate expanded memory without countries are expanded memory without countries are expanded memory memory with the expansion of the expansion

#### ■ EXPANDED MEMORY EMULATORS

tus's 1-2-3, Release 2, it will have access to expanded memory—possibly up to 8 megabytes of it.

Magic? Technical wizardry? Not quite. These programs take advantage of the device-independent nature of the Expanded Memory Specification to emulate expanded memory by using AT-type extended memory or hard disk storage. (They can also use floppy disk storage, but I don't recommend it.)

As we'll see, the emulation is not quite perfect. The expanded memory emulators reviewed here will not work with some plications that support expanded memory. They are also slower than expanded memory ob boards, sometimes even unbearably loss with the properties of the properties o

WHAT ABOUT LOTUS? In the discussion below and the reviews that follow, I talk more about the unusual problems (nession programs, print spoolers, compatibility with VDISK, background RS-212 database sorts, Levelin, DESQ/bei/w) than about the thing that most people use expanded memory for: I-2-3, Release 2, spreadsheets. All these programs work from with I-2-3, and you can check the benchmark tests to get rank people with the programs work of the with I-2-3, and you can check the benchmark tests to get rank of the programs work of the with I-2-3, and you can check the programs work of the with I-2-3, and you can check the programs work of the with I-2-3, and you can check the programs work of the work of the programs work of the program work of the programs work of the programs work of the programs work of the program work of the programs work of the program work of the programs work of the program w

Otherwise, pay attention.

EXPANDED MEMORY MANAGER
Expanded memory is bank-switched
memory. The total amount of expanded
memory (up to 8 megabytes) is divided
memory that are 16K bytes each. An
application can access up to four different
l6K-byte pages at any one time within a
single 64K-byte memory window. By
witching different 16K-byte rages in and

out of this 64K-byte memory window, the application has access to much more memory than would normally be available. An applications program that supports expanded memory usually does not directly control the bank-switching hardware of the expanded memory board. This is, in-

the expanded memory board. This is, instead, the job of the expanded memory manager, a driver program included with the expanded memory board. Applications communicate with the expanded memory manager through software interrupt 67h. The expanded memory manager then controls the board

The 65-page document called the Lowlow-line/Microsoft Expanded Memory Specification (LIM EMS) describes the way that an application can use expanded memory. Readers interested in the details of the Expanded Memory Specification can get a free copy of the document from Intl. (Wite to Interest Copp. RESOD Publiment.) (Wite to Interest Copp. RESOD Publiment.) (Wite Specification of the Copp. Mainting POD 4, Hillsbew, OR 971-20, Mainting POD 4, Hillsbew, OR 971-20, SMC Microsoft Press, 1986) also has a very cood discussion on expanded memory.

By placing this layer of software-the

expanded memory manager—between the applications program and the hardware of the expanded memory board, the LIM EMS defines a nearly device-independent interface. Applications programs neither know nor care where this extra memory is coming from. This is the key to how expanded memory emulators work.

#### EXPANDED MEMORY EMULATORS Expanded memory emulators are essen-

tially expanded memory managers that work without an expanded memory board. First, an expanded memory emulator needs to provide a 64K-byte expanded memory window. While an expanded memory board has a 64K-byte window in-

stalled somewhere above conventional memory, the expanded memory emulator uses instead 64k bytes within conventional memory. Second, an expanded memory emulator needs someplace to store more than

tor needs someplace to store more than four 16K-byte pages of memory that would normally fit in this 64K-byte window. In general, the emulators use either AT-type extended memory or a hard disk file for this storage.

Let's discuss AT-type extended memoyf first. Most of the memoy boards sold for the IBM PC AT these days can be configured for expanded memory, extended memory, or some combination of the two. However, early memory boards for the PC AT were purely bearbod memory boards, since EMS had not yet been invented. Memory boards for the PC AT that do not

| Estilo Estilo                         | ation boits | are: Summar          | , or reature        |                     |                                 |                                                |
|---------------------------------------|-------------|----------------------|---------------------|---------------------|---------------------------------|------------------------------------------------|
| Product/<br>Manufacturer              | List        | EMS version emplated | Memory<br>Nonactive | Overhead<br>Active* | Emplation<br>method             | Disk<br>access                                 |
| EMSimulator<br>Karn & Associates Inc. | \$49 95     | 3.2                  | 2K                  | 68K                 | Extended memory                 | No hard disk,<br>uses EMS only                 |
| LIMSIM<br>Larson Computing            | \$50 00     | 3 2                  | N/A                 | 70K                 | Extended memory                 | No hard disk;<br>uses EMS only                 |
| Micro VMS<br>Vericomp                 | \$75.00     | 3.0                  | ОК                  | 68K                 | Disk file                       | Uses DOS file I/O call:                        |
| V-EMM<br>Fort's Software              | \$89.95     | 3.2                  | N/A                 | 80K                 | Extended memory<br>or disk file | Uses BIOS calls                                |
| Above OISC<br>Tele-Ware West          | \$99.95     | 3.2                  | 7K                  | 86K                 | Extended memory<br>or disk file | Uses DOS file I/O calls<br>or DOS sector calls |

support expanded memory include the AST Advantage and RAM vantagel, the Tecmar Maestro, the Cheetah Card, and IBM's 2-megabyte Memory Expansion Option. Some AT compatibles, like the Compaq Deskpro 286, include a megabyte or two of extended memory right on the system board.

system board. (The Compaq Deskpro 386 includes an expanded memory emulator that uses extended memory. However, by taking advariage of the Virtual 86 mode of the 80386 microprocessor, the Compaq expanded memory manager does not have to reserve 64K bytes of conventional memory or transfer anything. The 80386 isometry provides the "baths, switching hardware"

right in the chip. I If you have a 2-megabyte extended memory board and are not using it for anyting (see side-har "The Extended Memory Interface: Slow and Sloppy"), some of for 2-megahers of expanded memory. Whenever the expanded memory emulaior for 2-megahers of expanded memory with the other short of the state of the short of the state of the short of the short of the short of the other short of the short of the short of current 16K-byte page from convention memory to extended memory. It will then transfer the requested page from convention

memory into conventional memory. Some of the expanded memory emulators can also use a hard disk file. This route is generally the only one for PCs and XTs, since these machines do not have the 80286 microprocessor required for accessing extended memory. For instance, if you set up the expanded memory emulator to provide I megabyte of expanded memory, it will create a 1-megabyte file on the hard disk. Whenever the emulator has to remap a 16K-byte page, it will write what is currently in that page to the file and then read another 16K bytes from the file into memory. In effect, this creates a very crude form of "virtual memory"; it does not occupy memory all the time but is available by transferring it from a disk.

THE SPEED PROBLEM At this point it should be obvious that expanded memory emulators will be significantly slower than normal expanded memory. Once the page is mapped in memory, the memory access time itself is no different, but the speed of remapping a different 16K-byte

■ With emulators that use disk storage, you may be amused (or maybe you won't) to see a disk access every time the spreadsheet

is recalculated.

page into the expanded memory window is increased greatly.

An expanded memory manager controlling an expanded memory board need only perform a couple of simple I/O port instructions to map one page out of the window and another page into the window. Expanded memory emulators must actually transfer I6K bytes out of the window.

dow and 16K bytes back into the window. Emulators that use extended memory will be faster than emulators that use a hard disk. The overall speed degradation depends on the type of application using expanded memory. For example, Above DISC ran the PC Labs Expanded Memory benchmark test in 4 minutes and 3 seconds



#### ·V-EMM

For sophistication, versatility, ability to ran with resident programs while using the disk, integration with installed expanded memory boards, and real virtual memory logic, nothing comes close to Fori's Software's V-EMM. It's the most expensive emulator, but it clearly outclasses the competition

If you have an AT and only need to get some use out of an existing extended memory board, you may find LIMSIM easier to install and use. using extended memory and I hour and 23 minutes using the hard disk.

The Expanded Memory benchmark test is a rigorous workout for these programs and gives you a good idea of what the speed degradation would be for database applications—severe. If the expanded memory is accessed nearly randomly, the emulator will need to make a lot of extended memory or disk transfers.

Spreadsheets will run slower, but generally not intolerably slower. With emulators that use disk storage, you may be amused (or maybe you won't) to see a disk access every time the spreadsheet is recalculated. You'll probably want to turn off automatic recalculation while working with the spreadsheet.

The thing you don't want to do with an expanded memory emulator is install a RAMdisk in it. This makes no sense. If you have an extended memory board, you can use VDISK instead. If you have an emulator working with a hard disk, a RAMdisk installed in expanded memory will be slower than the hard disk itself.

#### NOT 100 PERCENT COMPATIBLE None of the expanded memory emulators reviewed here provide 100 percent compatibility with an expanded memory

board. They simply cannot.

For instance, early versions of the Expanded Memory Specification included function calls that allowed applications programs to obtain the UO port addresses of the mapping registers. For speed reasons, some early programs that supported expanded memory directly accessed the mapping ports. An application that does this will not work with expanded memory contained. The programs was application that does this will not work with expanded memory contained. The programs was also also also allowed that the programs was also also also allowed the Expanded Memory Specification (Version 3.00) marks these calls as "inserver, of all letel encourages software vendors not to use the hardware.

Although the most recent version of the Expanded Memory Specification appears to be entirely device-independent, that device-independence is illusory. Expanded memory emulators have had some subtle problems with some applications.

An applications program may be structured, for example, in such a way that at times the same 16K-byte page of expanded

#### THE EXTENDED MEMORY INTERFACE: SLOW AND SLOPPY

The expanded memory emulators re-viewed here are really only the second large class of DOS software to take advantage of extended memory. Before these programs were introduced, the potential 15 megabytes of extended memory on the PC AT and compatibles remained virtually unused except for VDISK, IBM's RAMdisk program included with DOS 3.0 or later.

There's a reason for this. In contrast to the authentic memory management and multitasking support of the Lotus/Intel/ Microsoft Expanded Memory Specification, extended memory is a mess. IBM built only a minimal amount of extended memory support into the AT BIOS. The only thing that programs can do is stash stuff in extended memory and later retrieve it

Programs can use extended memory through the BIOS interrupt 15h. Interrupt 15h is IBM's catchall It's used mostly for a bunch of things that nobody really cares much about: the cassette interface. joystick support, the AT Sys Reg key, and TopView function calls.

Interrupt 15h provides two subfunctions related to extended memory, the first to determine the amount of extended memory installed and the secand to transfer data between convention.

memory is manned to more than one of the four areas of the 64K-byte window. Different routines in the program may write to this same block of memory using different addresses. The program will expect these changes to be reflected in each area where this single page is mapped. On an expanded memory board, the same block of memory is physically mapped to different addresses, so this works fine. With expanded memory emulators, it doesn't, because the application is writing to entirely different blocks of conventional memory.

If this use of expanded memory sounds too exotic for real programs, think again. The current release of Javelin uses expanded memory in this way, and none of the exal memory and extended memory. The overhead for this transfer is considerable, because access to extended memory requires that the 80286 microprocessor be run in protected mode for the duration of the transfer. Before switching to protected mode, the BIOS must prepare for the vastly different environment that protected mode requires.

The BIOS has to disable all interrupts during extended memory transfers. Current applications, current versions of DOS, and most of the BIOS code simply cannot run in protected mode. The disabled interrupts include, for instance, the timer tick running the PC's software "time of day" clock. The BIOS documentation in the AT Technical Reference manual refers to this problem with a statement that reads NO INTERRUPTS ARE ALLOWED. TIME OF DAY (ADJUSTED BY USER???) The question marks are a nice touch. The timer tick actually is not a problem. Timer ticks will not be lost even during the maximum 64K-byte memory transfer. The RS-232 interrupt, however, is another story.

After switching to protected mode to transfer data between extended memory and conventional memory, the BIOS must then switch back to real mode to return control to the calling program. This

have a documented method for switching from protected mode to real mode short of entirely resetting the microprocessor. The way IBM solved this problem was by including an output port register that does just this-it resets the 80286 microprocessor to a power-on condition.

is a problem, because the 80286 does not

Normally this would be just like rebooting, and so before the BIOS resets the 80286, it has to leave behind an indication for the BIOS startup code to skip all the normal reboot stuff and come back to the extended memory transfer routine.

The result of all this is that extended memory transfers are slow. On an 8-MHz AT, the BIOS call exacts an overhead of more than 600 microseconds. A 64K-byte transfer requires about 28 milliseconds, during which all interrupts are disabled. This can be a real problem for background communications programs. Most serial communications programs use the RS-232 interrupt to signal each byte of incoming data. Serial communications at 1,200 bits per second can experience data loss during an extended memory transfer involving more than 16K bytes. At 9,600 bps, extended memory

transfers should be kept to 512 bytes or The BIOS interface for extended

lower.

nanded memory managers reviewed here will work with Javelin. (Javelin works fine with the expanded memory emulation of the Compaq Deskpro 386, however, since the Virtual 86 mode allows the same physical block of memory to be accessed from different addresses.)

DESQview is another program frequently cited by writers of expanded memory emulators as troublesome. DESQview itself uses expanded memory in an unconventional manner and programs that run under DESQview may also use expanded memory, and so DESQview has the unenviable job of preserving the state of the expanded memory manager when multitasking between them. Just hearing the programmers of these expanded memory emulators talk about the problems they've encountered with DESOview made me glad I'm on the reviewing rather than the programming end of this game.

ACCESSING THE DISK The expanded memory emulators that access the disk have additional problems and may not be suitable for use with resident programs that use expanded memory, such as print spoolers.

Expanded memory emulators can access the disk in one of three ways: they can use regular DOS file I/O calls, they can use the DOS sector read and write calls, or they can go straight to the BIOS.

memory has a big additional problem: it has no memory management. Although a program can determine the total amount of extended memory, there is no way that it can determine how much extended memory is being used by other programs. The program has no way to allocate for itself a portion of extended memory.

Although you can install multiple versions of VDISK, this is only because VDISK has its own special way of determining whether a previous copy of itself is already using extended memory. Some of the expanded memory are with the property of the companion of the expanded memory as VDISK. (Conveniently, the source code for VDISK is included with DOS.) But none of the expanded memory emulators can do this in a perioral sense—they must include proposed the property of the proper

When DOS and applications programs that support the protected mode of the 80286 arrive, all these current problems with extended memory will disappear. We'll stop talking about conventional memory and extended memory. It will all become just plain memory again, except that then we'll be talking about 16 megabytes of it.—Charles Petzodd

Expanded memory emulators that use DOS file I/O calls have the most problems. When used with resident software that supports expanded memory, these emulators must guard against rentering DOS while another DOS call is in progress. The methods for doing this are not decumented. Even if they were, the emulator is still stuck between a rock and a hard place.

Let's look at an example. Suppose you have installed an expanded memory emulator that uses a disk file. You'r running a print buffer in this emulated expanded memory. An applications program is making a DOS call. A timer interrupt occurs that transfers control to the print buffer. The print buffer makes a page mapping

call to the expanded memory manager. The expanded memory manager must make a DOS call to do the page mapping.

If the expanded memory emulator makes the DOS call, a will crash. If it is aware that it can't make a DOS call, all is are that it can't make a DOS call, all it can do is return an error code back to the print buffer. But is the print buffer prared to deal with an error from the expanded memory manager? The answer is probably not, since there would be almost no reason for a normal expanded memory to return an error code.

Some of the emulators get around this problem (and get some speed improvements in the process) by using the DOS sector read and write calls or by using the BOS. This creates other problems: since expanded memory emulator is expecting the swap file always to be in a particular place on the disk, the emulator could destroy other files if you inadvertently erased the swap file.

**LIMSIM** Larson Computing's *LIMSIM* is for the IBM PC AT and compatibles. It uses extended memory addressed by the 80286 microprocessor to emulate expanded memory.

LIMSIM is by far the easiest of the five programs to use. You need only include the line:

#### DEVICE=LIMSIM.SYS

in your CONFIG. SYS file. You may also choose to add parameters to change the starting address and size of the extended memory used by LIMSIM, and the number of bytes transfered during page swaps. As a default it uses 16K-byte transfers, but you may want to decrease that if you do background communications at more than 1,200 bits per second.

If you also use IBM's VDISK for an extended memory RAMdisk, it must be loaded before LIMSIM. LIMSIM will generally detect if VDISK has been loaded and will not use the same extended memory. If LIMSIM can't recognize an extended memory RAMdisk, you can use parameters when loading LIMSIM to skip over that memory.

For \$25 extra, Larson Computing will include the complete 140K-byte assembly language source code for the *LIMSIM* driver. This practice is almost unheard of



these days. If you're interested in seeing the internals of an expanded memory emulator, this is the one for you.

The 32-page manual is complete and even includes a 7-page quick reference of the interrupt 67h calls used by applications for accessing expanded memory.

EMSEMULATOR EMSimulator from Kam & Associates also uses extended memory only and works with ATs and compatibles. It requires both a driver program and a resident program to get going. The driver program is loaded by a line in the CONFIG.SYS file:

DEVICE-EMSIM.SYS

But programs may not allocate expanded memory until the resident program is load-



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| EDUCATIONAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | For the IBM-PC, XT, & AT \$61.<br>(IBM PC, XT, or AT with 9-pin serial port                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -Color 722 - 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Computable lifetime<br>Smartmodem-to-AT cable (9 feet)                                                                                                                                       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| All educational programs listed are<br>copy-protected except where noted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Todales accurating cace, 415.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | - 15-foot Parallel Printer cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Blue Chip  -Managing for Success (American Dream) . 36.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Microprose (reqs. CGA)<br>• F-15 Srike Eagle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -3-Position (ABC switch box)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| -Millionaire                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| Berron'e                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| * Computer SAT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| Designwere (regs. CGA)<br>*Spelicopter (eges 6 to eduit)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Mindscape (reqs. graphics brd.)  Balance of Power (avoid nuclear war)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | *-Universal System Stand 25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Eduware (regs. CGA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Step Software (reqs. CGA)  ★ Golf's Best (Pinehurst or St. Andrew's) 19.  Parlor Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CABLES Smartmodem-to-PC Cable (9 feet)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Stans & Associates (sees CCA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| -My Letters, Numbers, Words (eges 1 to 5) 27.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| -Kids Stuff (eges 3 to 8)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Sierra On-Line (reqs. CGA)  *>Spece Quest 32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Printer-to-IBM cable (9 feet)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| -Calculus 32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| -PreCalculus                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| -Trigonometry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Simon & Schuster                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | * - Diamond-Plus (w/FAX & modern protection) 41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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6 ft cord)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| RECREATIONAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Spectrum Holobyte (regs. CGA)  * Orbiter (Shuttle simulation)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul> <li>Sapphire (3 outlets; EMIRF) filtered)</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| All recreational programs listed are                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | *-GATO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | * - Ruby Plus (w/FAX & modern protection) 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| copy-protected except where noted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| Starflight (regs. CGA)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| * Sergon III (highest rated Chess program) 32.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| Enchanter the Witness Planetfall                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| Leather Goddesses Hitchhiker's Guide                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| Leather Goddesses Hitchhiker's Guide<br>Moonmist Zork I eech 24.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| Zork II Zork III eech 27                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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**IPG-CONNECTION** 

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| Everex 1 year                                                                     |     |
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| -Evercom II 1200 Internal Modern \$119                                            | -   |
| -Evercom II 2400 Internal Modem 199                                               |     |
| 5th Generation 6 months                                                           |     |
| -Logical Connection Print Buffer 256k 319                                         | -   |
| Hayes 2 years                                                                     | -   |
| -Smartmodem 1200                                                                  |     |
| Smertmodern 1200B (w/Smartcom II) 349                                             |     |
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#### ■ EXPANDED MEMORY EMIJLATORS



#### Benchmark Tests: EMS Emulation Software

The Expanded Memory benchmark test was originally designed to test the efficiency of expanded memory manager is newthiching banks of memory on expanded memory boards. For a test of expanded memory emulators it should be regarded as equivalent to a large database sort. This is not the recommended application for expanded memory emulators. The results of this

test—where emulated expanded memory takes from 80 to 2,000 times as long as real expanded memory—clearly

show why.

The 1-2-3 Routine tests these expanded memory emulators within the applications environment for which they were designed. However, you'll notice that the results still vary wildly, the variable factor being the storage medium.

Using e RAMdisi (in extended The test results have been grouped according to whether extended memory, a RAMdisk, or a hard disk was used for storage. As expected, using he hard disk to emulate expanded memory shows the worst results but still within reasonable limits. Some of these products can also use a floppy disk for expanded memory emulation, but this would obviously be intolerable.

Performance Times (Times given in minutes and decimal minutes)

ed 1-2-3 Expanded 1-2-3 Product Intel Above Board AT 0.93 0.05 EMSimulator 4.02 LIMEIN Above DISC\* 4.05 1.121 5.371 2.95t 64 00t Micro VMS 1 53‡ 4 85‡ V-EMM

V-EMM . 142 14.63 2935 51.095

Above DISC on illso be configured to run an extended memory RAMSiok using DOS file I/O calls in addition to using DOS direct bother calls. There is, however, an average speed degradation of 20 to 30 percent. 1000S direct scalar calls. 1000S file I/O calls . §800S calls

The 14-3 Routine benchmark test is a macro that performs a series of both global and nichokular performs a series of both global and nichokular worksheet tasks. The macro copies and recatculates a 10-cell range 498 times, moves 1000 cells, deletes 1,000 cells, and then systematically clears the spreadsheet. This tests was unuder 12-3. Release 2, which supports expanded memory. When expanded memory by presset, 12-3 always stores the cell contents in expanded memory and uses conventional memory for their storage.

The Expanded Memory benchmark test allocates 255K bytes of expanded memory, and treats it as a series of 64-byte records. Then, 16,384 rendom records are read into end written from this memory. The result shown here is the average of the read and write time. Note: All tests were run on an IBM PC AT 8 B MHx. An Intel Above Board AT was used for the tests requiring extended memory. VDISK 3.2 was used for the tests requiring an extremed memory PAMdisk. The IBM 30-megabyte herd disk was used for the tests requiring a hard disk. The 17-2-3 tests were run with en IBM EGA and en 80297 meets coprocessor installed (both of which effect the



#### ■ EXPANDED MEMORY EMULATORS

ed. This prohibits programs loaded in the CONFIG.SYS file from allocating expanded memory. The EMSIM file takes no parameters and uses a 16K-byte transfer. It should not be used with background communications running faster than 1,200 bps. Compatibility with VDISK is guaranteed only for IBM versions.

The 64K-byte conventional memory is allocated when you run the resident program. Expanded memory is enabled by the command

EMSTAT E

and disabled by the command

EMSTAT D

provided no other resident program has been loaded in the interim. This is convenient if you use only one or two applications that support expanded memory and you want that 64K-byte conventional memory to be available for other applications.

MICRO VMS Micro VMS from Vericomp (formerly Syscomp) was one of the first EMS emulation programs. Being the first sometimes means you can stay ahead of everybody else. In this case, however, it means that Micro VMS is badly in need of an update. Vericomp plans to have an update ready by January 1987, but it was not available for this testing.

Version 1.0 of Micro VMS emulates expanded memory using a disk file. This file can reside on a conventional hard disk, or on a RAMdisk installed in extended memory, or on a RAMdisk on some other type of memory board, such as a Tall Tree Sys-



Micro VMS, Version 1.0 8825 Aero Dr., #210 San Diego, CA 92123

(619) 277-0400 List Price: \$75 Requires: Hard disk or RAMdisk recom-

mended, DOS 2.0 or later.

In Short: This early expanded memory emolator is due for an update. The version tested cannot be used with resident programs that use expanded memory. Not copy protected.

■ Version 1.0 of Micro VMS emulates expanded memory using a disk

file on a hard disk or on a RAMdisk

tems JRAM-2 board. Micro VMS requires both a line in your CONFIG.SYS file reading

DEVICE=MICROVMS.SYS

and a resident program called MICROVMS.COM. You specify the disk letter and the expanded memory size when loading this resident program. It creates a swap file and allocates 64K bytes of conventional memory for the expanded memory window. Even when you include all the necessary parameters, a screen pops up requiring affirmation in the form of a carriage return. This is annoying if you want to put MICROVMS.COM in your AUTOEXEC.BAT file.

If you want to run 1-2-3, Release 2, or Symphony, Release 1.1, with expanded memory. Vericomp includes two programs called VM123 and VMSYM that allocate the 64K-byte window in conventional memory, load 1-2-3 or Symphony, and then release the 64K-byte conventional memory upon termination. Because it does not involve removing a resident program from memory, this is a much safer method than the one EMSimulator uses for freeing up the 64K-byte conventional memory after you are done using expanded memory. The problem is that it works

only for 1-2-3 and Symphony. The manual includes tips and warnings about using a hard disk for expanded memory emulation. One thing the manual does not mention is the danger of running resident programs that use expanded memory, such as a print buffer. Micro VMS uses DOS file I/O calls to swap memory to the disk file and does so without checking if other DOS calls are in progress. Using an expanded memory print buffer with Micro

VMS will crash your system Moreover, MicroVMS, Version 1.0. supports only Version 3.0 of the Expanded

Memory Specification; so it will not work with Windows, Ready!, or DESQview. All the other programs reviewed here support Version 3.2 of the Specification.

The update planned for Micro VMS will include direct use of extended memory, a faster swapping method than DOS file calls, and EMS 3.2 support. The update will be free to registered users.

ABOVE DISC Above DISC from Tele-Ware West can emulate expanded memory using either extended memory (as LIMSIM and EMSimulator do) or a disk file (like Micro VMS). It requires both a SYS file and a resident program to get started. Parameters on the .SYS file specify the disk letter to be used for the swap file and the size. (A disk letter of X indicates extended memory.) Loading the resident program creates the actual file in your root directly and allocates a 64K-byte window in conventional memory for the EMS emulation. You can override the disk and file size when you load the resident program.

By default, Above DISC will access this disk file directly by reading and writing disk sectors without using the standard DOS file I/O function calls. This is faster. but somewhat more dangerous. "Manually deleting the swap file without terminating Above DISC." the manual says, "may result in serious damage to your disk files." If you prefer, you can specify that



Above DISC, Version 1.02 Tele-Ware West 909 Electric Ave., #202 Seal Beach, CA 90740 (800) 654-5301 List Price: 599.95 Requires: Hard disk, RAMdisk, or extended memory board recommended: DOS 2.0 or

In Short: This program supports both extended memory and disks, it has some flaws in dealing with disk files and cannot be used with resident programs that use expanded memory. Not copy protected.



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#### ■ EXPANDED MEMORY EMULATORS

Above DISC use regular DOS file I/O calls. This slows down the program, but it may be necessary for some odd disks.

When Above DSC is installed to use a disk file, it will crash resident programs that use expanded memory (such as a nex-panded memory print buffer), it will crash even when Above DSC directly accessed six sectors rather than using the normal DOS file I/O calls. This is peculiar because disk sectors rather than using the normal DOS file I/O calls. This is peculiar because directly accessing the disk sectors should avoid the DOS recently problem. However, DOSC uses to check if DOS is busy is called the undocumented fraction call that Above DOSC uses to check if DOS is busy is called and writes. This makes no sense and crash-est the program just as hard. Tele-Ware is working to correct the problem.

You can free up the 64K-byte buffer that Above DISC allocates for the expanded memory window, provided that no other resident programs have been loaded in the interim.

V-EMM Fort's Software's V-EMM is the most sophisticated program of the bunch. It offers the most options and, consequently is the most complex

Here are some of your orptions: You can install V-EMM to emulate expanded memory either in extended memory or using a disk file. When using a disk file, you can allocate more than 64K bytes of conventional memory for the emulator to cut down on the disk accesses. You can also use a 64K-byte chunk of memory at a segment above 640K bytes if you have a memory board that gives you one, gasin in

FACT FILE

P.O. Box 396 Manhattan, KS 66502 (913) 537-2897 List Price: 589 95 plus \$3 shipping & han-

Requires: Hard disk or extended memory board, DOS 2.0 or later.

In Short: Sophisticated and versatile, VEMM is the overall best choice. Its ability to work with an existing expanded memory board is an asset. Not copy protected.

ORDER OF ORRESCHASTANCE CANO.

V-EMM, Version 2.01

Fort's Software

Charles Petzold is a contributing editor of PC Magazine.

order to reduce the disk accesses.

You can also use V-EMM in conjunction with an existing expanded memory board so that the disk file adds to your existing expanded memory. The disk file would not be used until you reached the limits of your real expanded memory. At that point, V-EMM's least-used page replacement logic comes into play to improve the speed of such a configuration. For instance, if your application requires more expanded memory than is available on your expanded memory board, V-EMM will start allocating some of the disk file. If the expanded memory pages from the disk file are more frequently used than the expanded memory pages on your expanded memory board, V-EMM will swap them so

that the most frequently used pages are on your board rather than the disk. When emulating expanded memory us-

ing extended memory, the V-EMM driver can't detect the presence of a RAMdisk also using extended memory. By default, it it uses the same memory as the RAMdisk, but you can specify the extended memory starting address and amount for V-EMM to

use and effectively skip over VDISK.
For emulating expanded memory on a
disk, V-EMM supports only hard disks
with an IBM-compatible BIOS. It cannot
use a RAMdisk installed in extended
memory, a RAMdisk installed for some
other nonconventional memory board, or
mass-storage devices such as the Bermoulli
Box, When you attempt to use one of these
disks, V-EMM responds with the message
"Unsupported geing device."

By using the BIOS, however, V-EMM is able to show the best times for hard disk expanded memory emulation. The paging file is read-only and hidden to protect it from being erased.

Although V-EMM showed the best times using the hard disk, it showed the worst times using extended memory. To allow background communications as fast as 9,600 bps, V-EMM always uses 512-bpt transfers between conventional memory and extended memory. After hearing te timing results, the V-EMM programmer decided to include an option to change the transfer size. That will help.

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# SPECIAL DELIVERY MAILING-LIST MANAGERS

If you're thinking of choosing a mailing-list manager program, first you'd better have a good idea of how you intend to use it. The 25 packages reviewed in this article cover the spectrum from simple address books to high-powered mailorder managers. Selecting the specialized program that's right for you may deliver savings in time, trouble, and money.

This seems to be the time of specialized software. Generalized packages such as spreadshet generators, databases, and word processors are all being recategorized into smaller and smaller types. For example, not only are there now word processors both for professional writers and the occasional memo scribbler, but there are also outliners, real-time spelling checkers, font producers, and a plethorn of other specialized products.

Deathese ventors are and so getting means the specialization game. Just a few issues ago, PC Magazine covered text-based distabases, which are less structured and thus more flexible than their field-dependent peers. On the other end of this spectrum are the mailing-list managers, which are geared toward users who need increased structure—who, in fact, want to be able to simply start up a program and begin entering data without having to worry about the structure at all.

Mailing-list managers are database programs with one purpose: to generate mailing labels and lists of names and addresses in some sort of report format. A basic, nofrills MLM will include fields for names, addresses, and phone numbers, will sort

Database vendors are also getting into specialization game. Just a few issues on, PC Magazine covered text-based dases, which are less structured and thus reflexible than their field-denendern or manner formats.

Within this idea there are, of course, quite a few variations. Many MLMs include, with their basic address fields, places for alternate addresses and phone numbers, for business titles and honorifies (such as Dr., Mr., or Ms.). Several products add some sort of note field to their input screens. These fields can include comments on the specific entry ("Due for a raise in September") and can also be used as cooling aids.

Most products also include some method of user coding. This is practically a ne-

#### ■ MAILING-LIST MANAGERS

cessity—people who use MLMs must have some way to select specific entries other than simply by name or ZIP code, and individualized coding is the most efficient way to accomplish this. For example, and individualized websel to the control of the

The type of output that a mailing list users will be looking for a product that offers at least some variety in mailing label format; in addition, there are quite a few different types of report formats available. At least two of the products included in this review even produce entries formatted for small personal appointment book small personal appointment book and the products included in this point and the products included in this review even produce entries formatted for small personal appointment book and the products included in this point and the product point and the product point and the product point poi

Another type of output needed by many users is addresses useful for mail-merge operations with their word processors. It is helpful if you can generate mailing labels with your program; it is even better if you can also throw the same addresses onto the top of your business letters.

EASE OF USE At this point, some of you may be still wondering about the absolute necessity of mailing-list managers. After all, most reasonably efficient database programs will do all of the above quite nicely, and will have much wider utility in other areas as well.

First, many vendors are hoping that users will not want to bother with the type of database that requires them first to learn how to set up fields and structure reports. It would be much easier and quicker if an employee with little or no computer experience could just boot up the program and immediately begin to enter addresses. Thus, case of use is an important advantage offered by many of these products.

Another reason is price. Why pay \$300 or more for capabilities that you will never use—that, in fact, get in your way—when you can pay \$25 or \$50 for a product that does exactly what you need it to?

As a result, in our testing of these MLMs, we paid special attention to both ease of use and value for money. We be-

gan with a listing of 25 employee names—the bevily of the list was due to the inability of most of these products to accept precessing file standard the vendors old us that they would be quite willing when the control of the contro

We found that, for the most part, almost all the mailing-list managers performed with some measure of efficiency. Many were, indeed, extremely simple to learn and use; several were so friendly that they didn't even come with, or need, full manuals, but provided you with on-line help functions that more than adequately explained everything you would need to know. Others were more complex but still made it relatively simple for us to input the entries and turn out neat mailing labels in a short space of time. And, of course, there were the one or two that were awkward enough, or expensive enough, to make us wonder why they were on the market at all.

Yet another cautionary note is in order here. Shortly dafer reviewing these programs, I coincidentally found myself about to send out a mailing to approximately 150 private schools in the United States. It was, I felt, a fortunate happenstance: I could simply draw on one of the products I had just finished reviewing and get the job done easily and quickly.

Therefore, while a good mailing-list manager can save you a great deal of time, trouble, and cash, it would be wise to first investigate your own mailing-list needs thoroughly before making a purchase. After all, even a \$50 software product is no bargain if it doesn't do the job.

—Barbara Krasnoff

COMMON TO A STATE OF THE STATE

#### Bulk Mailer

If you like the Macintosh or Framework's pull-down mems, then you ought to give Satori Software's Bulk Mailer, Version 4.0, a try. This \$125 program uses pull-down menus and function keys for all features and operations. Bulk Mailer does an admirable job of handling small to medium-size lists up to 10,900 names). There is also a \$350 version that will work with up to 50,000 names.

Version 4.0 of Bulk Muller is not copy protected and has no particular installation peculiarities. All you need to do to install the program on a hard disk system is copy the program files included on the single system disk onto the hard disk. For neatness' sake, you'll probably want top rut the files in their own subdirectory. To run the program, just type BULK at the DOS ormorput (assuming the current default drierctory is the one in which the Bulk Muller rectory is the one in which the Bulk Muller files reside), and you're off. To can asserted a lary time to inquire about settings or default or armorphism.

I did not have the proper manual during my review and testing period. Version 4.0 is a major revision of *Bulk Mailer*, and while the programming was complete at



the time of testing (November 1986) the manual was not. All I had were galley sheets of the first few pages of the manual, and they included information only about the simple installation process and general instructions about using the menus. However, Satori also sent me the manual for its Macintosh version of Bulk Mailer, which includes the same features and runs in essentially the same fashion as the IBM PC version. The good news is that you probably will have little reason to use the manual. The better news is that the manual, when it is finished, will also be patterned after the excellent manual for the Macintosh version of the program.

to the state of th

MALL-ROUTE SORTING You can put potal-carrier-toute sorting codes in your entries. When you tell the program to print labels, you can specify that it print the CAR-RT SORT designation and the appropriate numbers. This feature and the ability to perform large ZIP sorting to separate the labels into three- and five-digit ZIP code bulk-mail groupings can save money in bulk postal rates, as well as time in the preliminary manual sorting and burning the control of the cont

Bulk Mailer provides easily accessible and flexible control of printed output. You can choose type size and weight from the Printer menu and also configure the printer menu and also configure to code so your benefation of the printer menu and also configure to code so your common to send special escape code so your code in the printer code in the printer so code sequences, which care usually listed in the printer manual. Bulk Mailer comes already set for the standard Epsonal Bulk dot matrix; printer and Epsonal Bulk dot matrix; printer and Epsonal Bulk of the manual common the printer and the process case.

Bulk Mailer includes a greeting-line extinue being FILE PATRI Bulk Mailer APPEND RECORD: (^) Last Name COMPANY: {/} Hide {^} 1st F-Keys (EV ..... (F1) BOUT ... (F2) PRINT. (F3) CITY.STATE: FIND...(F4) PHONE: (+4 or CAR-RT) ULL...(F5) PARAMS. (F6) SEARCH CODES: XCODE (Date) : {ur /no/ dau} EN... (F7) CLOSE...CF8 DELETE CF9 QUIT...KF18 Menus... (ALT) <0,F,E,S,L,P,0> Back...(PgDn) Forward...(PgUp) Accept., (Keypad)(+)

Bulk Mailer's input screen includes the command menu on the top of the screen, a function key reference on the right, and other relevant command key reminders on the bottom. This level of user prompting makes reference to the manual almost unnecessary. feature that lets you print a message, such as "Check new low prices," across the top of each label. The greeting message is specified at the time of printing so that you don't have to use valuable record storage

space.

Record searching and duplicate record deletion are both very easy with Bulk Mailer. Both processes are started from windows in which you can set specific parameters. You don't have to learn a complicated query and command language for these tasks; all you do is fill in the blanks.

Other than not having Bulk Mailer's real manual at the time of testing, my only other hesitation about the program is its use of the F10 key for quitting the program. You use the Alt key with specific letter keys to access the pull-down menus. The Alt key is right next to the F10 key on the IBM PC, XT, and AT keyboards and on most compatible keyboards. If you hit F10 by mistake, you are thrown out of the program immediately. That's disconcerting. It turns out to be a greater scare than a problem, though, because every time you leave a record, it's automatically saved. The most you will lose by accidentally exiting the program is one record. However, an "Are you sure you want to leave Bulk Mailer?" message or other second-chance

prompt would be a helpful addition. In sum, Bulk Mailer is a fine package especially suited for people or organizations that want to take advantage of bulk-mail rates. It's easy to use and includes enough features for it to meet most moderate mailing-list-management needs.

-Bruce Brown

#### Client List

If your mailing-list needs are very simple, you may have to look no further. Client List is a BASIC language program suitable for mailing lists with no more than 250 names. Client List's performance may be limited, but the program costs only \$35, providing no-frills mailing-list management at an o-frills price.

Client List is Navic Software's main program. The offspring programs use most of the same BASIC code but sell at still lower prices and are single-purpose lists that are less flexible than Client List.

#### ■ MAILING-LIST MANAGERS



The Christmas card list program, for example, cannot print labels in ZIP code order. List n Label, another of Client List's spin-offs, is briefly reviewed separately in this orticle.

All you have to do to use Client List is load the BASIC programming language. Otherwise there are no special installation or configuration steps. Client List comes with just two pages of documentation. You're told to load BASIC and start the program. Fortunately, you don't really need much instruction to run be program.

There is no tutorial, but you can probably survive by following the simple menus and prompts. If you know that you need very complete written documentation, this soft-

ware is not for you. When you run Client List, you make very simple menu selections to start functions such as adding or editing names, set you screen is a simple vertical list of field annew. You cannot customize or change the entry screen at all. It's primitive, but it does work. Client Liris limited to 250 records. Two coding fields are available, category and classification. You can sort except you can sort of the property of the property

ing when printing labels.

That's about it. You enter names and addresses and use two fields for coding. You can print labels in alphabetical or ZIP code order or as sorted by either of the two sort codes. These limited functions printing the control of the printing t

ings, but they didn't even know about one of the problems, which is that you cannot call up a record on the screen if that person is the second or greater in your file with the same last name. You can work around the problem by first going to the preceding record and changing the name temporarily.

but you shouldn't have to do that. Client List also runcates entries that are too long. If you type in more than fits in a field, the last letters just disappear. This can be pertly dangerous if you don't notice it. Client List sets up a list as one file with 250 entries, and it will not let you delete individual records. If you want to get rid of a name, your only alternatives are to replace the name with blanks or to overwrite the information with another person's data.

There is also no way to leave the program gracefully. When you're done working with Client List, you have to break out of the BASIC program by holding down the Ctrl key and tapping the Break key.

You are not able to name files; Client List works with just one file and loads the file itself. Also, you must use capital letters for commands, which is not mentioned in the brief documentation and might be tough to figure out for the beginners for whom this program is intended.

Client List will do your job if your list consists of no more than 250 people, no two of whom have the same last name, and if you can live with the program's limitations. The best things going for Client List are price and simplicity. Since you can find much more serviceable programs for only \$15 more, I'd suggest you keep on looking.—Bruce Brown

Client List uses a primitive entry screen format. The program, which limits the number of total records to 250, offers no-frills mailing-list management at a no-frills price.

#### Data \*Face DC Hitima

#### Data\*Easy PC Ultimate Mailer

Data\*Easy is a programmer's mailing-list manager. It comes in uncompiled BASIC, so that the programming is easily accessible (in fact, you can exit the program to either BASIC or DOS), and is organized in the kind of linear manner that is probably every comfortable for those used to dealing with software in that manner. However, other users may have trouble.

When you enter Data\*Easy, you are introduced to a long list of functions in alphabetical order. Unlike most other mail-

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247

239

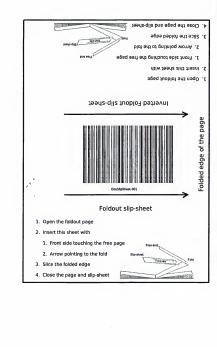
119

425

217

97

Circle #400 on reader service card.



J. Follow instructions on the other side

Inverted Back



Back

1. Follow instructions on the other side

# d overnight delivery









#### **Compaq Deskpro** 386-40 Mh

16. 8 & 4 MHz Clock Speeds • 1 Mb Ram Memory • 80386 Based CPU • One 40 Mb Hard Drive (w/controller) . One 1.2 Mb Half / Height Floppy Drive \* 6 Expansion Slots \* Compaq 101 Key Enhanced Keyboard . One Serial One Parallel . Color or Monochrome Available as Ontion

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|                                                   | Modular Graphics Card 249                           | VEN-TEL                                                    |
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| 00000000000000000000000000000000000000            | Color/Mono                                          | PC Modern 1200 Half Card . 359<br>1200 Plus                |
| ARROGADE AGE                                      | EGA Plus Graphics 369<br>VIDEO 7                    | PC Modern 2400 Helf Card . 469                             |
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| SERVICE DE 10 10 10 10 10 10 10 10 10 10 10 10 10 | VEGA Deluxe (1/2 Card) 395                          | MOUSE SYSTEMS                                              |
|                                                   | STB                                                 | PC Mouse w/DR Halo 2 Special                               |
|                                                   | Chauffeur 209                                       | MICROSOFT                                                  |
|                                                   | EGA Plus 309                                        | Microsoft Mouse (Serial) \$135                             |
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| (AST Comp) I/O                                    | COMMUNICATIONS                                      |                                                            |
| Half Card 105                                     | BOARDS                                              |                                                            |
| IAR                                               | AST                                                 |                                                            |
| nn (384K) 199<br>DRAM                             | 5251-11 Plus \$655                                  |                                                            |
| coard (384K) 155                                  | 5251-11                                             |                                                            |
| oard 155                                          | DCA                                                 | Manager Diversion Control                                  |
| w256K 349                                         | IRMA Board 779                                      | Mesterplece Plus \$119<br>CURTIS                           |
| y (AT) 128K (6-8 MHz) . 315                       | MODEMS                                              | Diamond 39                                                 |
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| fath Co-Processor . 139                           | W/Smartcomii 339                                    | 3270 PC 235                                                |
| eth Co-Processor . 199                            |                                                     | 5151 (AT&T)                                                |
| IICS BOARDS                                       | The second second                                   |                                                            |
|                                                   | -                                                   | MEMORY STORAGE                                             |
| v \$239                                           | 550 11.0000000                                      | IOMEGA                                                     |
| k Premium/EGA                                     |                                                     | Bernoulli Box (10 + 10)\$1999                              |
| Low Price Calli                                   | 0                                                   |                                                            |
|                                                   | Smartmodem 2400 599<br>Smartmodem 2400B             |                                                            |
| 3A 569                                            | w/Smartcom II 549                                   |                                                            |
| ohics 106                                         | LOGICSOFT                                           |                                                            |
| ES Combine                                        | Logic (Hayes Comp.) 1200                            | Marie Control of the last                                  |
| ome Graphics                                      | Baud External Modems . 179                          |                                                            |
| rd 155                                            | Logic (Hayes Comp.) 2400                            | The second second                                          |
| Card Plus 209                                     | Baud External Modem 309                             | D                                                          |
|                                                   |                                                     | Bernoulli Box (20 Mb) 1899<br>Bernoulli Box (20 + 20) 2499 |
| Hercules Comp.)                                   |                                                     | Bernoulli Box Plus 4199                                    |
| Grephics Board 89                                 |                                                     |                                                            |
| dropinos boditi 00                                |                                                     | HARD DISK DRIVES                                           |
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|                                                   | 1                                                   | PRIAM CORP                                                 |
| The second second                                 | - Intitution                                        | 60 Mb Internal Herd Drive                                  |
|                                                   | -                                                   |                                                            |
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| ced Graphics                                      | Internal Modern with                                | PLUS +                                                     |
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| HE HE                                             | Logic 2400B Internal Modern<br>2400B w/Software 299 | ( Company of )                                             |
|                                                   | PROMETHEUS                                          | 5-1204                                                     |
|                                                   | Pro-modem 1200 279                                  | 100                                                        |
|                                                   | Pro-modern 1200B                                    |                                                            |
|                                                   | w/software 239                                      |                                                            |
| ercules Comp.)                                    |                                                     |                                                            |
| graphics Board 99                                 | TOSHIBA                                             | Hard Card 20 Mb 675                                        |
| lercules Comp.) graphics Board                    | TOSHIBA<br>1200B Laptop Modern<br>(T1100 Plus)      | Hard Card 20 Mb 675<br>SEAGATE<br>10 Mb ½ Ht Int           |

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| PC Modern 1200 Half Card .                                       | 35   |
| 1200 Plus                                                        | 3    |
| PC Modern 2400 Helf Card .                                       | 44   |
| MOUSE INPUT DEVICES                                              |      |
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| PC Mouse w/DR Halo 2 Sp                                          | eci  |
| PC Mouse w/DR Halo 2 Sp<br>MICROSOFT                             |      |
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| 20 Mb Ext                  | 649  |
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| QIC 60 Ext Tape Backup     | 1579 |
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| 60 Mb Ext                  | 1599 |
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DATA SHIELD

Image Tape Backup 

Image Tape Backup

| 60 Mb Ext                   | 159 |
|-----------------------------|-----|
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| Panesonic 360 K 1/2 Ht      |     |
| Tendon TM-100 360 K F/Ht    | 125 |
| Tandon TM-100 360 K 1/2 Ht. | 105 |
| Toshiba 360 K 1/2 Ht        | 115 |
|                             |     |
| BACK UP POWER SUPPL         | IES |





ing-list managers, which tend to group functions in some sort of logical fashion, this program simply lists them all alphabetically in one central menu. Although this does put all the editing and printing functions together, new users still must scroll through at least three screens before they have seen all the various choices.

Data\*Easy's input screen begins with a system of sort keys and record numbers. Both can be either entered by the user or generated automatically by the program. In the latter case, the record number is simply the next number in line. The sort keys are the first initials of the last- and firstname fields.

Once you have hit return to pass the sort-key field, you are in a 15-character select-codes field into which you can put any type of alphanumeric code you have chosen for identification. Data's Easy includes a unique feature here—when you put a Z in the 11th position, the program automatically drops the ZIP code into the last five positions.

One of the program's nicer characteristics is a 24-character note field that appears at the bottom of the input screen. Each note has its own number and date, and therefore you can have up to 99 notes attached to each entry—one example of Data\*Easy's flexibility.

Data\*Easy allows you to sort your file on almost any field, up to eight fields. You can also do a variety of select functions, though, in this case, the program encourages you to do your select on less than the full field, since it is faster; however, you can do it either way.

In fact, Data\*Easy, Version D, has many versatile features which, if you're thoroughly acquainted with the program, could come in handy. (Versions A through C have fewer features and their prices vary accordingly.) For example, users are encouraged to type names in last-name, firstname order for better sorting: if you don't want your labels to read that way as well. you can reconfigure the program to print the names in "reverse" sequence. But the fact that you had to go through the trouble of making that change puzzled me: Are there many corporations out there who prefer their mailing labels to read "Doe. John"?

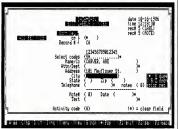
Unfortunately, Data\*Easy\* map good qualities are clouded by the pogram's general awkwardness. You really do have to take the time to explore and experiment with the program before you canue use it properly, and some knowledge of BASIC wouldn't hart either. The folks at Data Consulting Group have a good idea of what functions are needed in a good mailing-list manager, a little research into eronoomics might be in order.

—Barbara Krasnoff

#### FastPak Mail

How about a personal guarantee that software will work? FastPak Mail's manual starts with a letter from the president of DHA Systems & Software promising just that. This stance in an industry that usually guarantees nothing is impressive and reassuring. FastPak Mail is a modern program with nice screens and several sophisticated features that make it stand out from some of its older and more sparsely featured competitors. At \$79.95, DHA Systems & Software's product deserves a close look for small to moderately large mailing lists. When you register your software the company sends you 1,000 free mailing labels, a nice incentive for users and a good way for DHA Systems & Software to build a list of customers for future updates and other products.

Don't expect to take a long time learning this program. FastPak Mail has online, context-sensitive help screens. The



Data\*Easy's edit screen gives users many different options: for example, an asterisk in the Sort Kery field will automatically generate a record number; an asterisk in the City field will bring forward the city, state, and ZIP code from the previous entry. A 24-character note field lets you create up to 99 notes for each entry. Notes are numbered and dated.



#### Mailing-List Managers: Summary of Features

mon almole invitation lists to huge bulk mailings, there is a mailinglist-imanger program for every project and every protection.

Is the case with most applications software under \$200, the number of returnes included in a program is dereity proportional to the price. Take a close look at the maximum number of records handled and the data conting capabilities of the programs to get an idea of their relative power.

| Product                                                                                                                                                                                                | Bulk Mailer | Client List | Date-Easy<br>PC Ultimat<br>Maller | FeetPak<br>Muli                        | Flowmali                            | KeyMeller   | Label<br>Express | Label<br>Master                         | List& Mall | List n<br>Label | List Pro  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-----------------------------------|----------------------------------------|-------------------------------------|-------------|------------------|-----------------------------------------|------------|-----------------|-----------|
| List price                                                                                                                                                                                             | \$125.00    | \$35.00     | \$95.00-<br>\$225.00              | \$79.95                                | \$100.00                            | \$149.00    | \$49.95          | \$35.00                                 | \$59.95    | \$12.00         | \$295.00  |
| Maximum no. of records                                                                                                                                                                                 | 10,900      | 250         | 32,000                            | 10,000                                 | 30.000<br>hard disk,<br>1,900 Roppy | 32,737      | 500              | Unitvited<br>hard disk,<br>1,000 floopy | 30,000     | 250             | 32,000    |
| SUPPORT                                                                                                                                                                                                |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| On-line tutorial                                                                                                                                                                                       | •           | •           | 0                                 | 0                                      | •                                   | •           | •                | 0                                       | •          | 0               | •         |
| Manual tutorial<br>On-line help                                                                                                                                                                        | •           | 8           | 0                                 | :                                      | 0                                   | :           | 0                | 000                                     | :          | •               | 0         |
| COLOR                                                                                                                                                                                                  |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| Supports color<br>Can change color                                                                                                                                                                     |             | 8           | 00                                | 00                                     | 00                                  | :           | 00               | •                                       | 0          | 00              | 00        |
| DESIGN                                                                                                                                                                                                 |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| Specific field types<br>Field checking or masking                                                                                                                                                      |             |             |                                   | :                                      | 0                                   | :           | :                | 0                                       | 00         | 00              | :         |
| DATA CHECKING                                                                                                                                                                                          |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| State code<br>ZIP code                                                                                                                                                                                 | 0           | 0           | 0                                 | 0                                      | 0                                   | 00          | 00               | :                                       | 00         | 8               | :         |
| DATA ENTRY                                                                                                                                                                                             |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| Maximum no. of ZIP code digits<br>Foreign postal codes<br>Disto keys<br>Case conversion<br>Multiple record update<br>Multiple record deletion                                                          | • 00        | 500000      | 5                                 | •                                      | .0.000                              | 000         | •                | •                                       | •          | 5 00000         | •         |
| RECORDS SAVED                                                                                                                                                                                          | •           | 0           | •                                 | 0                                      | - 0                                 | •           | 0                |                                         | •          | 0               | •         |
|                                                                                                                                                                                                        |             |             |                                   | After                                  |                                     |             |                  |                                         |            |                 |           |
| On entry, in batch/buffer, user command                                                                                                                                                                | User        | Batch       | Balch                             | every 4                                | Entry                               | Entry       | Entry            | Batch                                   | Entry      | Eatch           | Saich, us |
| DATA IMPORT/EXPORT                                                                                                                                                                                     | Import/     |             |                                   |                                        | Import                              |             |                  | Import/                                 | Import     |                 | Import/   |
| ASCII                                                                                                                                                                                                  | export      | None        | Export                            | import/<br>export                      | export                              | Export      | None             | export                                  | export     | None            | export    |
| DIF                                                                                                                                                                                                    | None        | None        | None                              | None                                   | None                                | None        | None             | None                                    | None       | None            | None      |
| RECORD RETRIEVAL                                                                                                                                                                                       |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| Query language<br>Retrieval by any field<br>Retrieval by more than one field                                                                                                                           | 000         | 000         | 000                               | 000                                    | 000                                 | :           | 000              | •                                       | •          | 000             | Ö         |
| DATA SORTING                                                                                                                                                                                           |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| Auto ZIP code order Auto last name order Single-field sorting Multiple-field sorting Glingle-field sorting Glingle-field indexing Multiple-lead indexing Multiple-lead indexing Multiple-lead indexing | •           | 0000000     | ••00••0                           | 000000                                 | •••••                               | 0           | 0.00             | 0000                                    | 00000      | 0000000         | 0.00      |
| LABELS                                                                                                                                                                                                 |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| Prodesigned labels Custom formats Maximum no. acrose Size selection Field trimming Line trimming Proper-name capitals                                                                                  | 0           | 0 1000      | 0                                 | ************************************** | • • • • • • •                       | • • • • • • | 0 0 0 0          | •                                       |            | •0-0-00         | 0         |
| REPORTS                                                                                                                                                                                                |             |             |                                   |                                        |                                     |             |                  |                                         |            |                 |           |
| Column formats Specified formats Choice of formats Mail-merge Padicates Editor's Choice                                                                                                                | 0           | 0           | 0                                 | :                                      | •                                   | 0           | 0                | 0                                       | :          | 0               | •         |

Another important consideration for some users is file import and export. Thirteen of the programs reviewed are capable of both importing and exporting ASCII files. Another six can only export ASCII files, leaving six that can do neither. Two of the malling-list managers, America and Coderd Mallworks, can handle DIF files as well as

|   | Maller            | Melling<br>Liet | Mailing<br>List I | MaiLiet | Mell-Track-<br>with Letter<br>Merge | Mell-Yrack-l<br>with Letter<br>Merge II | Molitrak          | MBS Mullir<br>Label<br>Program | ng<br>HamePro               | Oxford<br>Mallworks         | Super<br>Base                        | Super<br>Mail                        | Super<br>Melling<br>List | Travelin<br>Side/Go |
|---|-------------------|-----------------|-------------------|---------|-------------------------------------|-----------------------------------------|-------------------|--------------------------------|-----------------------------|-----------------------------|--------------------------------------|--------------------------------------|--------------------------|---------------------|
|   | \$79.95           | \$99.95         | \$49.95           | \$59 95 | \$49.95                             | \$95.00                                 | \$65.00           | \$119.00                       | \$29.95                     | \$49.95                     | \$35.00                              | \$25.00                              | \$14.95                  | \$69.95             |
|   | 32,766            | 32,767          | 2,800             | 10,000  | 2,500                               | 32,766                                  | 4,300             | Unlimited                      | 1,000                       | 15,000,000                  | 33,000<br>hard disk,<br>1,600 floppy | 33,000<br>hard disk,<br>1,600 tioppy | Unimited                 | 310                 |
| - | 0                 | 0               | •                 | 0       | 8                                   | 0                                       | 0                 | •                              | 0                           | 0                           | •                                    | •                                    | 0                        | 0                   |
|   | ŏ                 | •               | •                 | •       | ě                                   | •                                       | •                 | :                              | •                           | •                           | •                                    | ò                                    | 000                      | •                   |
|   | :                 | 0               | 0                 | 0       | •                                   | 0                                       | •                 | •<br>0                         | :                           | •                           | •                                    | 0                                    | 0                        | :                   |
| _ | :                 | :               | :                 | 0       | :                                   | :                                       | •                 | :                              | 0                           | 0                           | 0                                    | 0                                    | :                        | 0                   |
| _ | :                 | 0               | 0                 | 0       | 0                                   | •                                       | 0                 | •                              | 0                           | 0                           | 0                                    | 0                                    | 0                        | 00                  |
| _ |                   | ,               | ,                 | 9       |                                     | ,                                       | 9                 | 9                              |                             | 9                           | ,                                    | 9                                    | 10                       | 9                   |
|   | :                 | :               | :                 | :       | :                                   | •                                       | 0                 |                                |                             | :                           | •                                    | •                                    | 000                      |                     |
|   | 0                 | 000             | • 000             | 000     | 00                                  | 000                                     | 0                 | 000                            | • 00000                     | 00                          | 0000                                 | 0000                                 | •                        | •0000               |
| _ |                   |                 |                   |         |                                     |                                         | 0                 |                                |                             |                             | 0                                    |                                      | •                        |                     |
|   | After<br>every 16 | Entry           | Entry             | Entry   | After<br>every 4                    | flutch                                  | Entry             | Entry                          | Entry                       | Entry                       | Entry                                | Entry                                | Entry                    | Batch               |
| _ | Import/<br>export | None            | None              | Export  | Export                              | import/<br>export                       | import/<br>expert | None                           | Import/<br>export           | Import/<br>export           | Export                               | Export                               | Import/<br>export        | Import/<br>export   |
|   | None              | Hone            | None              | None    | None                                | None                                    | None              | None                           | export<br>import/<br>export | export<br>import/<br>export | Rione                                | None                                 | None                     | None                |
| _ |                   | :               | :                 | 0       | 000                                 | •                                       | 0                 | 0                              | 8                           | 0                           | 8                                    | 0                                    | 0                        | 0                   |
| _ | •                 | Ö               | Ó                 | Ō       | Ó                                   | •                                       | •                 | •                              | Ō                           | •                           | •                                    | •                                    | Ō                        | •                   |
| _ | 8                 | 0               | •                 | 0       | 0                                   | 0                                       | 0                 | :                              | •                           | :                           | 0                                    | 0                                    | :                        | :                   |
|   | ě                 | 0               | • 0 • 0 0 0 0     | 0000    | 0000                                | 000                                     | 00000             | 0                              | 0                           | •                           | 0                                    | 8                                    | •                        | 0                   |
|   | 000000            | 0000            | 00                | •       | 8                                   | 0                                       |                   | •                              | 8                           | :                           | 8                                    | 000                                  | 0000                     | 000                 |
| _ |                   |                 |                   |         |                                     |                                         |                   |                                |                             |                             |                                      |                                      |                          |                     |
|   | 0                 | 0               | 0                 | 0       | •                                   | :                                       | :                 | •                              | 0                           | •                           | :                                    | 0<br>3                               | 0                        | ;                   |
|   | :                 | :               | :                 | 00      | 0                                   | :                                       | :                 | :                              | :                           | :                           | 0                                    | 9                                    | 0                        | :                   |
|   | •                 | ò               | •                 | 8       | •                                   | •                                       | 8                 | 0                              | 8                           | 8                           | 8                                    | 0                                    | :                        | •                   |
| _ | •                 | 0               | 0                 | •       | 0                                   | :                                       | 0                 | 0                              | 0                           | 0                           | 0                                    | 0                                    | •                        | 0                   |
|   | :                 | •               | • 0               |         | 00                                  | Ö                                       | •                 |                                | •                           | :                           | :                                    |                                      | •                        | :                   |
| _ | •                 | 0               | 0                 | •       | •                                   | •                                       | •                 | •                              | •                           | •                           | •                                    | •                                    | •                        | 0                   |

#### ■ MAILING-LIST MANAGERS



help screens combined with comprehensive prompting menus and a good manual are probably all you'll need to get up to

for coding. Not copy protected.

speed with the program very quickly. FastPak Mail will save up to 65,000 records. According to the publisher, however, the sorting routine will work with only about 10,000 names, so you should heed that warning and split your lists if they are very large.

The main component of the program is

the FastPak Mail menu. From this place in the program, you choose several of the program's many features or you select a submenu that will take you to another, similar menu that lists more-specific choices. At all times, hitting the Eac key takes you back to the previous menu. Common sense shows very clearly in the design of this program.

To speed data entry, you can configure the program to skip the company field if few of your names include or require company information. Even if it is configured out, you can get back into the company field if you want to save that type of information for selected individuals.

manion for selected individuals.

FastPak Mail automatically saves records after every fourth record. A nice feature that can save disk storage space, and mailing costs as well, is a duplicate-entry-checking feature that will display all dupli-

cate names to give you the chance to delete space-wasting copies.

Another nice feature is the pattern search, with which you can make the program search all fields in all records, looking for all or part of a name or text string. So if you know that somewhere buried in your lists is a person or company with the word Frox in its record, you can just specify that the program search for Frost and any record with that particular text string in any field will be selected and displayed.

This facility is particularly helpful for those times when you think you have a record for a company with a certain name but don't know when to find it.

For those times when you need to go out to DOS to find information about a file or disk or to make room on a disk, FastPak Mail includes a DOS utilities function that will let you run particular DOS commands from within the program. This feature is a real time saver.

FastPak Mail will let you choose predesigned label formats and print labels up to 25 across. You can also program custom report formats.

I had no problems at all running Fast-Pak Mail and can find nothing to complain about. Its intuitive design and many features make it a good choice for most mailing-list jobs.—Bruce Brown

#### CONTRACTOR OF THE PARTY OF THE

#### Flowmail Flowmail is a simple, nuts-and-bolts mail-

supported peers.

tected.
CIRCLE 602 ON READER SERVICE CARD

ing-list manager that is both produced and marketed by Flowsoft Custom Programming, which is a one-man operation. As with many programs produced by small companies, Flowmail does its job well but does not contain any of the refinements that can be found in its more substantially

The main menu lists your options at the outset. The first, File Management, controls both file creation and update. Once



#### astPak MAIL MENU Copyright (c) 1985 DHA Systems Version 1.15

- U = DOS UTILITIES (Dir/Copy/Erase/Rename/Type/Print)
- I = lnput/Scan/Delete/Labels/Master/Fix/Condense/Newfile/Exit
- 1 = MERGE print form letters from mail list and text file
- Q = QUICK SORT (Alpha/Company/Zip/Reference)
- S = SELECT specific records from mailing list
- C = COMBINE two or more mailing list files
- L = LABELS 2 or 3 wide
- D = DUPELIST list duplicate names
- H = HELP complete FastPak MAIL Help System

Select option (ESC to exit): \_

FastPak Mail's logical command menu includes quick control of all major functions. Another sophisticated feature is the program's ability to execute a number of DOS commands without exiting to the promot.

# A funny thing happened on John Hart's first day at his computer...



he got results.

John Hart was already convinced his new computer could make life easier. What worried John was that it would take him weeks, maybe months to get the most out of a software program.

PFS\*: First Choice changed all that. The first thing John noticed was the instruction manual. It wasn't huge and complicated like other software programs. In fact, First Choice let him get started immediately.

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By the end of the day, John Hart discovered that in the time he had set aside for his first lesson, he had already used First Choice to write a dozen error-free letters, create customer files, make

sales calculations, and check the Dow Jones News/Retrieval. He can hardly wait for tomorrow. PFS: First Choice.

No Experience Required.



#### MAILING-LIST MANAGERS



Flowmail's data entry form is very simple and easy to understand, even for new users. The Print Codes field allows users to sort on a variety of their own codes.

you have named your new file (but before you enter the input facility), you can choose to carry over various information, including address and user coding fields.

The Spartan input screen includes fields for company name, first and last names, two address lines, city, state, ZIP, and phone fields, and fields for user coding labeled Print Codes and Data Line. From this area, you can also do a search on the entry number or last name, or scroll through previous entries.

Flowmail seems to be distinstful of your tendency to delete unnecessity. During data input, I found that while I could type over mistakes, I could not delete any information. The record-delete function does not really eliminate records—it simply gives them a Delete label so that the program ignores them dispose to that the program ignores them day change your mind at any time, you change your mind at any time, you can the update function to restore the entry. There are also noutines for eliminating

duplicate entries, merging files, and creating mail-merge files.

Before you perform any listing func-

tions, you must first sort your file. You have several options here: Flowmail will create index files in alphabetical or nuinerical order for the ZIP code, company, last name, record number, state, or data line fields.

Two different options support user out-

put. Lists produces a simple columnar report on your screen or printer (you can include either all information or select four fields), while Labels produces a number of basic label types, including options for Rolockey cards and ervelopes. Before printing, you are offered several options, including starting and last record number or and whether you want condensed or regular type (the default is condensed).

Flowmail is a clean and useful, if limited, product. But considering the sophistication of some of its less expensive peers, Flowsoft may want to reconsider the software's relatively high price of \$100. If you want to try it out, you can obtain a free demo disk that self-destructs after 30 days.—Barbara Krasnoff

THE STREET STREET

#### KeyMailer

KeyMailer from Softkey Software Products is as slick and professional as any mailing-list manager on the market today. Unlike many of its competitors, the programming is smooth and well planned, in-

cluding context-sensitive help files, an easily decipherable menu structure, and superior functionality.

This is obvious in the way in which KeyMaller is organized. Its opening menu is divided into Entry & Editing (for additis), Maintenance (for deleting and sorting and decesses), File Generation (for mall snerge functions), Labels (which is in itself drividcid into categories for small and large address labels), and a large variety of available list types, including a fall address; a variety of abbreviated formats, and two types of routy and formats.

The entry (and search-and-edil) screens include both a salutation and a title field, one phone field, a country field, a contact (which can be automatically generated by the company), and five user-coding fields, labeled comments, identifier, and codes 1, 2, and 3. You can push the F8 function key to "ditto" the previous address and F9 to quickly produce a label or envelope from that specific entry that specific parts and F9 to quickly produce a label or envelope from that specific entry.

KeyMailer has an interesting autoscan feature that, when toggled on, automatically searches for a name as soon as it has been entered into the name field. This not only aids in quick-search functions, but automatically pevents duplicate entries. However, it also slows things up considerably, so that Softkey recommends it be kept off when you are entering long lists of data.

Another powerful search feature involves using the @ wildcard symbol. You can do a search of partial information in a





In Short: An excellent, professional-level mailing-list manager for businesses with substantial needs in this area. Five coding fields. Not copy protected.

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#### MAILING-LIST MANAGERS



identifier field. These, plus the context-sensitive help facility, are representative of the product's flexibility.

field by preceding the phrase by the @, or, if your memory is really poor, you can use @@, which will search through every field in every record for that particular phrase.

Whenever you choose to print labels, you are first taken to a selection screen where you can select on any of the fields using a variety of variables, including the @ function, fencing (which will select between two values), either/or, or <>. These comparatives are also available for data searches

Once you have made any selections, the report sequence control allows you to change your key field (providing it has been sorted), report order, or output facility. KeyMailer also includes a special feature called update record processing, which allows you to make global changes to your file.

KeyMailer is an excellent, professional-level mailing-list manager. Since Softkey has also recently eliminated one of its few inconvenient qualities-its copy protection-it is that much easier to recommend it for those companies who are looking for a higher-end product.

-Barbara Krasnoff

#### Label Express

Seymour Papert, the father of Logo, said that just because computers can be used to do something doesn't mean they should. This concept fits the Rolodex, a standard business tool for years. Many microcomputers still share desk space with a Rolodex-brand cardholder. Sure, computers can maintain a list of names, but in order to find someone you have to turn on the computer, start the appropriate program, and then issue the correct commands. If you are trying to find just one name, you can often find it quicker with a Rolodex.

The drawbacks of a Rolodex card file and other noncomputerized methods of storing names are that you can only look up names by the order in which they are stored (usually alphabetically by last name or by company, sometimes by both if you use two cards per person), changes usually require typing or writing a whole new card if you want to keep it neat, and any kind of printing, such as mailing labels or selected lists, requires manually searching for and then retyping the needed information.

So while the Rolodex and its imitators remain the most convenient tools for

quickly looking up information about one person (assuming you know where to look), most other tasks involving lists of names are improved by computerization. Many people have both a Rolodex and a computerized name file. Since the Rolodex was there first, in those offices that have only one place where names are kept. that place is most likely to be a Rolodex.

Rolodex Corp. now covers both worlds with Label Express, an excellent mailinglist program that prints name, address, and telephone information on Rolodex cards. Label Express also prints in other formats, including mailing labels and selected lists.

Label Express comes with a terrific manual and incorporates several fairly sophisticated features. At \$49.95, it's a sure winner and probably a good way to sell Rolodex cards as well (if I sell you a razor, you'll need to buy blades). You can theoretically use Label Express with any size list, but my technical contact at Rolodex told me it recommends lists of no more than 500 names to maintain adequate sorting speed. When you start a new list you tell the program how big the list will be after all the names are in. The default list size is 500 names.

It's easy to keep multiple lists for different purposes (just as many people keep more than one Rolodex card file). Label Express displays the names of up to ten lists on one disk drive. Actually you can have more than ten lists per disk drive, but only the first ten will show up on the program's list selection screen.



When you enter name and address information with this program, you type it in a screen representation of a mailing label. You have total control of how to use the space, and you are not restricted to specific fields. This method of entry is helpful because information that just won't fit usual formats can be easy to put in if you can type it in anywhere you want on a label. There are separate fields for a reference key (usually last name), ZIP code, and a 10-character selection code, as well as a telephone field and a notes field. The program also keeps track of record creation and modification dates. For entering or editing names. Label Express uses the somewhat standard WordStar cursor movement codes. These codes are a standard used in many other programs, but because they will be new to many people who decide to use this program, there are lessons in the manual specifically covering Label Express's keyboard use. The documentation for Label Express is professional and complete.

HELPFUL HOW-TO APPROACH Unlike the manuals for several of the programs in this survey, Label Express's has a full index and several appendixes—and card. The manual uses a how-to approach to all functions of the program, including menting, the so of the program including menting, the solid process of the program section of the Express performs a concentral duplicate check using the reference code field contents. If the program signals that you've entered a duplicate record based on the reference code, you can then change the record's contents, delete the record, or saw it as it. You can also turn duplicate check-the signal of the program signals with the program signal to the program also turn duplicate check-the signal of the program signal to the program of the program and the program of the program o

ing off if you choose. There is also a "ditto" key capability for entering repetitive information, but unlike some programs that always remember the field contents of the previous record, the design of the ditto feature in Label Express is inconvenient to use for a single record. It's more useful when several records contain the same information in one or more fields.

You can search for names in Label Express in one of two ways: by exact match or by a sound-alike method. The soundalike procedure works fairly well but requires that the first letter in the search word be the same as in the entered word. With his feature, for example, you could find a record containing the name Centurion by entering Century.

When you print labels, you can specify

fined printing formats, including labels, Rolodex cards (of course), listings, envelopes, and badges. You also can design special formats yourself

special formats yourself. While there is a great deal to like about Label Express, there are a few minor points that could bear some improvement. Label Express makes its own subdirectory during installation. The installation instructions give key-by-key prompting, but the process may still be confusing for inexperienced users. If you don't allow Label Express to assign its own subdirectory name, the program just doesn't run correctly. Also, Label Express doesn't get date information from the computer system. Resetting the date is a cute routine using the Plus and Minus keys, but you really shouldn't have to do that. It would be so much easier and efficient if Label Express used the computer system date.

Label Express has the backing of Rolodex Corp. and is listed in many business and office supply catalogs, often next to the ads for Rolodex cards. The company probably selfs a lot of copies because of this exposure. If so, its success is deserved; this program gives you a lot of performance for the price.—Bruce Brown

#### Label Master

Label Master, from RKS Associates, is one of those programs that restores your faith in the triumph of the underdog. It is a highly efficient, refreshingly simple, and very useful mailing-list manager that is



field for coding. Not copy protected.

CIRCLE 672 ON PEADER SERVICE CARD



Label Express's entry screen has a label printing box where you can see how your label will look when printed.



#### KeyMailer Label Master

The mailing-list managers covered here tended to cluster at the lower and higher ends of the spectrum, from quick-and-easy, simpler programs to complex, corporate-ori-

ideal for computer-sty employees. On the upper end of the scale, KeyMailer is a flexible, well-structured product that provides users with many of the features found in more-complex database software, including adequate user-coding facilities, a wide range of comparatives for use in selection and sorting, and a complete assortment of label and report formats.

you-like-it system—whose creator has, in fact, decided to abandon an attempt at traditional marketing in favor of relying on the enthusiasm of his customers.

When you enter Label Master, you are immediately introduced to the main menu, which occupies the top half of the screen, and the entry-defu area, which takes up the bottom half. Label Master's entry forms contain separate last-name and first-name fields and include the usual spaces for company name, full address, and phone numbers, along with a user-coded field labeled Notes.

The menu offers 12 choices: you can



Label Minster is one of those programs that need no manual: it is immediately understandable and does its job quickly and neatly. The Edit Record function calls up the record screen complete with a user-coded field labeled Note.

choose to add a new record, deleterrecall a record, edit or display a record, or seroll to the previous or next record. You can also togel the index according to either the last name or ZIP code (Label Masser maintains both), print out the entry that is currently being displayed, or flip to a notepad facility of the control of the con

One of the most interesting features of his program is the way it provides a fall-safe for deletions. When you "delete" an address from your flet, at extally becomes "inactive." It is still there, but simply does not appear on any printed lists. You can restore inactive records or delete them fully through the Utilities feature, which, along with Print, is also accessed from the main meets.

The Utilities menu also contains several small services of the kind that may not be absolutely necessary but are extremely helpful to have around. My favorite is a state/ZIP code function against which you can run your address list. Any entries that contain wrong state abbreviations or ZIP codes (It checks the first three digits) will be noted. You can also check for dunlicate

records, sort your list according to last name, ZIP code, or organization, import or export records, get an entry count, or arrange to address envelopes.

Label Master produces up to four labels across in a variety of sizes. It also produces a columnar report format (termed a Directory) that lists the various entiries in a simple but readable manner. The Print menu gives you a wide range of choices for printing out your labels, including a choice of regular or condensed print, whether or not to print the phone numbers and notes, and whether to print by last name or ZIP code order.

In short, Label Master is inexpensive and effortless, and produces neat, well-organized labels. Unless you feel the need for a more sophisticated report format, I would give this excellent shareware program a long, hard look,

-Barbara Krasnoff

#### ACTUAL PROPERTY OF THE PARTY OF

#### List&Mail

It is always interesting to come across a software product with an original approach. Avery International Co.'s List-d.Mall approaches the concept of a mail-ine-list manager not as a restricted form of





In Short: An efficient and interesting mailing-list manager which includes several handy features not supplied by its competitors, including a Physback feature and a basic word processor. Four one-character "list indicators" for coding. Not copy protected. OPICE 486 ON PREADER SERVICE CAPD.

database, but as an entirely unique type of software.

It does this by totally separating the base of names and addresses from its sorting, selecting, and printing functions into four separate programs: address manager, list manager, and print manager. All addresses are entered into a main listing through the address manager. This listing is your informational base: you can add, delete, or search for entries, but

you cannot otherwise manipulate the data.
Once your addresses have all been en-

on to the main datafile, you then pass on to the list manager. This allows you to create separate sublists with addresses drawn from your main file, using one of two processes: manual or automatic.

In manual mode, you page through your main datafile, indicating to the program each entry you want to be included in your new list. Although this can be a painstaking process, manual lists have one advantage: they can contain new information that is not in the main file.

In automatic mode, you draw your entries directly from the main file by selecting on one or two criteria: for example, all entries that do not have "NY" in the state field, or that have the same user code (List-&Mail's input screen includes four onecharacter "list indicators"). Because this list is totally dependent on its parent file. the information it contains cannot be changed; however, it can be sorted on as many as two fields in either ascending or descending order. New addresses are added to the main entry base, after which you must perform an update function on your automatic list. At that point, you can also change your list's selection criteria.

hange your list's selection criteria.

The form manager sets up the format in

which you will output your data. It also contains one of List&Mail's more irritaing features. Avery, also a top manufacturer of labels and other printer forms, evidently wished to encourage users to buy its products; hence List&Mail lists Avery's stationery order numbers rather than descriptive phrases to indicate which type of label you can choose to print. Some salesperson may have considered this a clever marketing ploy; I consider it a missaler.

If none of List&Mail's prepared forms suit your needs, you can adjust an existing format or create a new one by filling out a "form specification" screen through a simple but flexible process that takes little or no programming ability.

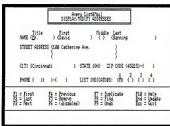
There are also a few extra features that do Laint Mail's utility including a basic word processor that can be used to create business letters and notes, and set business letters and notes, and extended the programs—that records any series of actions and plays them back. I found that Plays specified the programs—that records any series of actions and plays them back. I found that Plays specified the protein it is to update, sort, and print routine in less than half the time it would have taken me to perform the same actions manually.

Avery obviously has its List&Mail mailing-list manager targeted at the business community that wants few frills and lots of efficiency. For the most part, it has provided a fine product for the purpose.—Barbara Krasnoff

#### List n Label

It can't possibly get any simpler than this. List n Label is a spin-off product of Navic Software's Client List program (also reviewed in this article), and it, too, will hold only 250 names. It automatically sorts them in last-name order or by category, but it won't let you sort by ZIP code or in any other order.

List n Label is a BASIC program that costs only \$12, but because of its limitations I'd suggest you set your sights a bit higher. To give the program its due, List n Label is easy to use. The toughest part of it is starting BASIC and loading the program. If you can handle those steps, the rest of the process is a breeze. There are no other installation steps, no tutorial, and practically no documentation, since there



List&Mail allows for only four one-character user codes or list indicators, but its selecting and sorting capabilities outweigh this drawback.

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| EX-1000 300 CPS, 132 Colcall<br>LQ-800 180 CPS, 24 Pin Headcall<br>Hewiett Packard                                        | Rampage-PC                                                                           | A company of the same of the s |
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#### ■ MAILING-LIST MANAGERS



List in Label's entry screen is almost identical to Chent List's. The only difference is the mussin classification field.

are just two sparsely filled pages of instructions for starting the program.

Working with List n Label is just like working with Client List, except that there's even less to do. Simplicity is nice, but in this case it's too constraining. Everything about List n Label is already decided for you. Your 250 names must fit into predetermined fields, including one category field that lets you enter two character codes. List n Label will sort by last



Twelve character fields for coding. Not copy

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protected

■ List Pro II is difficult to use. If you are in the mail-order business, however, this program is worth thousands of

dollars.

name or by the category field, but if you want to print your labels in ZIP code order, forget it.

If names or addresses don't fit into the field sizes, you must abbreviate. You also cannot print labels more than one label wide.

All command entries have to be in capital letters, and the only way to leave the program is to hold the CrI key and tap the Break key. If you have two people with the same last name, you'll have a tough time editing the second one because the searching process will continue to find the first instance of the name, not the second. If

you can remember, and live with, those limitations, List n Label may be just the program for you.

In sum, List n Label is an inexpensive, barely functional program. It works, but I'd recommend at least stepping up to its big brother, Client List, although that program shares most of its limitations.

—Bruce Brown

#### COMPRESSION OF THE PARTY OF THE

#### List Pro II

List Po. II includes many special-purpose fields and features that would have little value for many lists but are terrific for customer tracking. The program is a bit awkward to use and can't be called user friend, by by any means, but it sure has loads of functions. If your customer listing and tracking needs fifte fleatures and functions of this 5205 program, you should have been supported by the property of the system, but the necessary disk swapping would make that configuration impractical.

The program files take up almost a full 1 megabyte themselves. List Pro II was designed for use on a hard disk drive system, and that's the only reasonable way to use it. List Pro II's installation routine creates its own AUTOEXEC. BAT and CON-FIG.SYS files.

If you have already created those files yourself, don't worry—List Pro! Changes their names until you finish using the program. The Finish command will remove List Pro! If from your hard disk and put back your original files. It's pretty clara that Professional Publications intends this program to be the only program run on your computer.

Litti Pro II includes a demonstration that takes you quickly through the program's features. This can hardly be considered a tutorial, however, because you are asked to look up how to accomplish specific and the compart of the comp

#### PeachText 5000: **Five Office Productivity Packages** for the Price of One

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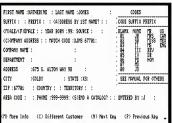
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List Pro II's entry screens include a prompting screen for entry codes. The program, while too complicated and powerful for the needs of some users, is a real bargain for retailers or mail-order companies.

Its menu structure requires you to use the Enter key to move down through items. You activate the desired alternative by pressing the Esc key (a reversal of the normal use of this key). If you go past the setection you want, you have to go to another menu to reload the menu you just left. List Pro It also insists that you use only capital letters when issuing commands and for filling in many fields.

I found myself out of the program once



In Short: List Pro II is a difficult, often awkward program that is loaded with special features for mail-order and other retail customer tracking applications. Five customizable flags for coding. Not copy protected. CHOLE BY ENDEADER SERVICE CAPO when trying to print labels. The printer configuration was wrong, and in order to stop the printing I tried the CIT-Break key sequence. Printing stopped, all right, and so did the program. All that was left on the screen was the DOS prompt C>. I later learned that there is no way to stop printing once it starts without aborting the program. This is inconvenient.

FEATURES AND FIELDS And now for the good news. List Pro II has many special features. The Company Configuration function allows you to determine several default settings such as sending compressed type to the printer, converting all entries to uppercase, making some of the code fields required fields, and using a security code. You can set the maximum number of records, the security code itself, drive settings, and up to five optional flag descriptions. You can search records by any or all of the following fields: last name, company, ZIP code, phone number, sequence number, match code, and record number

The program includes state abbreviation code and ZIP code checking, as well as fields for catalog requests, first order date, and Do Not Mail To. Do Not Rent

Name, and Bad Debt fields. Some special functions for customer tracking include fields that will update and figure out the number of orders, number of items or-dered, total dollars in orders, average order amount, and date the last catalog was sent. Most mailling-list managers will not even allow this many fields, let alone do the figurine for you.

List Pro II includes a line editor that will let you create documents up to 500 lines long. You have limited formatting control over margin widths, justification, and centering. If you set the file extension correctly you can import ASCII files created with other editors as well.

List Pro II is preset for four wide Cheshire-formatted labels. Other report formats are possible but require user customization. The manual includes extensive program documentation and file structure information, as well as a listing of error codes and a complete index.

List Pro II is difficult to use and too much program for many users. If you are in the mail-order business, however, this you buy it for \$259 and then set up special fields, reports, and system defaults to meet your own needs, you will be far ahead. Then you can train someone else to use the program.—Bruce Brown

#### BEATS HEAD AND

#### Mail-Track-I with Letter Merge

The people who designed Mail-Track-I with Letter Merge put the user first. Mail-Track-I is a very flexible program suitable for small to medium-size mailing lists of up to 2,500 names. The program is completely menu driven and includes some impressive features, as well as a merging program for form letters. Mail-Track-I is a seed value at \$49.95.

Sapara Mero Software, Mail-Track-Sapara Mero Software, Mail-Track-I's publisher, has added several touches to the program's design and operation that reflect both concern and respect for users. For example, all you have to do to install Mail-Track-I is make backup copies of the disk. When you run the program, it loads into RAM, so you can remove the program disk. You are invited to record tous to Sa-

pana, in return for which you are promised



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#### ■ MAILING-LIST MANAGERS



a replacement program within 1 week for no additional charge.

When you start Mail-Track-I, you can change the background and foreground colors simply by tapping the Enter key while you're at the main menu. Each of these features alone is convenient; together they reflect a considerate attitude.

The program's manual is designed to work on three levels. Those who hate to read documentation will find a one-page, quick-start overview. For those who read

manuals selectively, there is a guide that tells you which sections to look at for particular purposes. Manual hounds can read the whole manual in under an boar, and the whole manual in under an boar, and the whole manual in under an boar, and the whole manual in under the whole manual in the whole manual whole manual in the w

The program includes a 34-character message field where you can put notices such as "Attention—Keep This Letter" or whatever you'd like. This feature is very handy. There is also an eight-character coding field that you can use to identify subgroups within your first. Later on you code pattern. You can also use this feature to build smaller lins from a master list by selecting by codes and outputting matching records to a new file.

Mail-Track-I includes a Dupe Warning Switch that can be turned off. If you are entering many names in the same ZIP code, you'll want to turn the Dupe Warning Switch off because it tests for the same last name, first letter, and ZIP code. Mail-

Track-I also lets you enter titles and nicknames in the name field if space allows and gives you a way to use them in custom re-

porting,
Mail-Track-I maintains lists in ZIP
code order automatically. You can sort by
any field. A somewhat unusual feature is
the ability to have both domestic ZIP and
foreign postal codes mixed within the
same file. The program uses a comprehensive, helpful label-printing configuration
screen that lets you see all of the printing
settings for the current label run. This level
of control and monitoring is very desir-

There is a lot to like in Mail-Track-I. I found it to be a feature-laden program that gives very good value for \$49.95. —Bruce Brown



Letter Merge II

MultTrack-I with Letter Merge II is a hot
product. If you can't find the features you
need in a mailing-list manager in MultTrack-II, then you may need a customized
program. MultTrack-II is the ligh brother
of Sapana Micro Software's MultTrack-I
and includes all of its sibling's features,
plus much, much more. This powerful
product is more than worth is 895 price

Sometimes powerful programs are difficult or awkward to use. Even though Mail-Track-II has many features, it still runs nicely with explanatory menus and prompts. The manual does a good job of explaining the program's various features. You may find that this program lets you do things you never even thought were possible to accomplish with your mailing list. For example, Mail-Track-II includes a software switch for turning on or off the automatic indexing and sorting functions. This feature really comes in handy when you're entering a lot of names at one time and don't want to wait around for the program to index and sort after each entry.

If you want to use the standard defaults, there are no special steps to install Mail-Track-II. If you want you can customize such settings as colors used, printers, duplicate-entry-checking level, numbers of fields. Jabel formats, sort key fields, and so



Mail-Track-I's data entry screen includes a status line that keeps you informed of file information while you're working on specific records.



Mail-Track-Il features an informative status line at the top of the entry screen. Designed for fairly large lists, the program offers up to six levels of duplicate-entry checking.

on. All that's necessary to set the start-up defaults is to use an ASCII line editor to change selected values and entries in the setup files. This easy way to customize default settings is one of the most powerful features in Mall-Track-II. The program comes with several templates for prewritne alternate setups of the program that accommodate different kinds of lists, a helpful touch.

Mail-Track-II is designed for mediumsize to fairly large mailing lists. The maximum file size is 32,766 names. There are six levels of duplicate-entry-checking sensitivity, ranging from no checking at all to requiring that all sort keys, first name, initial, and last name be the same before the program alerts you to having a duplicate name on file when you are making a new entry.

standard of the control of the contr

The merging component of Mail-

Track-II is beefed up from that in Mail-Track-I to include, in addition to other features, the ability to set default merging entries for specific fields. To aid in data entry or merging capabilities, Mail-Track-II will both import and export comma-delimited ASCII files.

The bottom line is that Mail-Track-II is a tremendous program. For \$95 you get a program that will probably meet most of your mailing-list-management needs. —Bruce Brown



Requires: 256K RAM, one disk drive, DOS 2,0 or later. In Short: Mail-Track-II is a very powerful, feature-laden program that is quick and fairly easy to use. A good choice. Three coding fields. Not copy protected. OPALE MASCHIEDERSPRICECHO

#### THE PROPERTY OF THE PARTY OF TH

#### Mailer

You can tell when a program has been designed to meet the needs of its intended market. Mailer, a sturdy program that is easy to use and quite accommodating, is such a well-planned product. Maurità asociates! program has somewhalt limited indexing and custom reporting capabiliies, but that should not detreat from its solid value. Previously priced at \$1.50, Mailer's new price to \$79.95 m has the er's new price to \$79.95 m has rement.

You don't have to do anything special to start to use Maller. The only customizing you might want to consider is color. You can use the DOS DEBUG program to change Mailer's colors, but, while this process is explained well in an appendix in the manual, it is difficult for novice users. If changing colors is that important, there should be an internal routine to do if.

Other than color customizing, which most users will ignore anyway, all other features and functions in Mailer are designed with the user in mind. The manual is complete and has a gracious style, the content presented clearly and completely. The manual includes a tutorial section that walks yout through all maior functions.

When you are actually working with Mailer, all operations and functions are performed via menus and prompt lines. Users sometimes forget to refer to the screen when they are confused, but if you can remember to look at the screen and read the prompts, most of this program's

operations will become clear. Data entry with Mailer has several convenient features. Parameters (the way things are entered) are checked for telephone and ZIP-code entries, and so you can't, for example, tell Mailer that someone's telephone number is Elm Street. State abbreviations are also verified and converted to uppercase. There is a "ditto" key that will copy the field contents from the previous record, a real timesaving feature when it's as easy to use as it is in this program. Mailer asks you to verify each record's contents, after entry. If you accept the contents the program goes on to the next record. Otherwise you go back to the desired field to make changes. This extra

#### MAILING-LIST MANAGERS



Mailet's entry screen includes command prompts for all user actions. A timesaving ditto key to copy field contents from the previous record is another useful feature.

step does slow you down a bit (if you have no errors), but only by one keystroke. The program automatically saves new records after every 16 entries.

RECORD SELECTION Mailer's capability for record selection is very impressive. You can specify up to 20 criteria for record selection. If you need more than 20 search criteria, you should write your own program. One slight twist is that in order to select on one or more criteria you need to output a separate file, but that isn't much of a drawback.

Mailer also has the ability to search an unsorted file. This feature is a convenient timesaver that lets you search for needed information at any time. Mailer allows you to merge separately created lists, but they must be sorted by name, company, or ZIP code. When you are importing lists, the source file can only bring in one reference field because that's all Mailer's record structure is designed for, which may be a limitation for some files.

Mailer uses predesigned label formats either one, two, or three across with both field and line trimming. In addition to labels, there are also eight menu-selectable report formats, as well as an alphabetical directory of all names. Mailer also has a nice routine for adding the return address for either single or continuous-feed enve-

Mailer can be used for mail-merging with WordStar, NewWord, WordPerfect, Microsoft Word, Volkswriter Deluxe, Spellbinder, Select, and MultiMate. Since





Mailer, Version 2.5 Maurizi Associates 1344 Fitch Way Sacramento, CA 95864-3031 (916) 486-2993

List Price: \$79.95 Requires: 128K RAM, one disk drive, PC-DOS 1.1 or later, MS-

DOS 2.0 or later In Short: Mailer is a competent mailing-listnagement program with very good record retrieval capability and a sensible user interface. One reference category for coding. Not copy protected. ORCLE 677 ON READER SERVICE CA

Mailer exports ASCII files, other programs can use Mailer names as well.

Mailer does have some shortcomings. These are not problems in execution, just features that the program doesn't include. Mailer does not allow indexing, nor does it have a comprehensive custom reporting facility. The limitation of only one coding field, the reference field, is also somewhat constraining. In all, Mailer is a good buy, Data entry

is fairly simple and foolproof, record retrieval is better than average, and reporting in either label or other preset formats is adequate. Mailer's price/performance ratio is just about right.-Bruce Brown

#### Mailing List

Howe Software's Mailing List has been around in various incarnations since 1979. In that time it has been and still is available for CP/M machines and for three generations of TRS-80 computers. The current MS-DOS version (Version 3.0) costs \$99.95 and provides generic mailing-list facility with the main features most users care about, except the ability to merge names with text.

While there is no tutorial provided, the program's simplicity and its clear structure make it easy to learn. The on-screen menus and prompts are simple enough so that, combined with the manual, there's not a lot you need to learn. The company does not charge a fee for user support, so registered users can telephone Howe Software's support line for help. There's no toll-free line, however, so it will cost you for the phone call.

Mailing List uses eight predetermined fields and can handle up to 32,767 records. There is a "ditto" key function for making data entry easier. Records are saved after every entry, which protects you somewhat from losing your file with an improper keystroke or because of a power outage or other problem. You can retrieve records by any field, but you can sort by only one field at a time.

After you type in the field contents, Mailing List redisplays the information in mailing-label format and asks for your confirmation before it saves the record. Since you enter information in a simple vertical field list, this composite display is

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#### 

Mailing List's entry screen is rudimentary but gives you a chance to change field contents based on label characteristics such as size and format.

■ Mailing List I is a good program for someone who maintains a number of small mailing lists, but its limitations make it hard to recommend for larger applications.

a helpful way to check a record's contents. Mailing List uses a predesigned label with the content of the cont Mailing List also will not export or import files of any type. Not being able to export ASCII files for use with other programs severely limits Mailing List's flexibility. If you want to keep a list of your clients, customers, or members and occasionally want to send a somewhat personalized letter, Mailing List won't suffifice. You must repeter all names into an-





(in Cant.) List Price: \$99.95 Regulres: 128K RAM, one disk drive, DOS

2.0 or later.
In Short: Mailing List performs most of the expected functions with some attractive extra features such as automatic envelope addressing. "Key group field" for coding. Not copy protected.

CHICAL BY ON HEADER SERVICE CARD.

other program in order to produce form letters.

Mailing List is a mature program with all the bugs weeded out. It runs very well, but its rudimentary user interface and lack of more-sophisticated features make it overpriced at \$99.95.—Bruce Brown

2003/11/2004

#### Mailing List I

Alphanetics, Mailing List I maintains up to 25 separate mailing lists on one disk. All information about running the program is on the disk, which is convenient if you don't like manuals but is an aggravation if you prefer paper instructions. Mailing List Fy features include several unique functions that make it a good program for handling small mailing lists.

This program is a reasonable buy at 849.95. The program is just a bit tricky to learn at the start, but once you understand it, Mailing List should be easy to use. Installation of Mailing List is all done automatically in response to a few user prompts issued from the screen at start-up. The main concern is where the data will be stored. The program makes nice use of color with a very attractive screen varieties.

There is no separate manual for this program. All you get with the program disk is a one-page feature list and a single-page start-up sheet that covers all Alphanester that the start of t

Mailing List I uses a different tactic from many of the other programs reviewed in this series. You can build up to 25 different mailing lists and then select them from an on-screen menu. This approach is especially convenient if you have to maintain different lists for different purposes or organizations.

A disadvantage of Mailing List I is that you have to tell it in advance how many entries there will be in a given mailing list. Separate mailing lists can be merged, but in no case can a list include more than

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#### ■ MAILING-LIST MANAGERS



Mailing List I has an interesting entry screen with the sort field automatically using the last name entered in the name field. Notice that in this case the program skipped the first name and correctly found the last name. If you wish, you can manually change the contents of the sort field.

2,800 names. The data entry screen is very pleasant to use. In addition to telling you the current drive and filename, date and time are displayed continuously on the screen. You type both first and last names in the name field, and the program finds the last name and uses it for the automatic



lists. It has several excellent features but will

only work with small lists of up to 2,800

names. Not copy protected

 MaiList is meant for serious business. Its entry screens have room for a great deal of data, and it allows for a wide margin of sort and selection criteria.

sort field. If you want, you can override this designation and enter your own choice of contents in the sort field. There are also fields for an attention line, a selection code and comment, and a field that records the

date the name was entered.

One of the program's most powerful features is the ability to sort a mailing list by any field. You cannot customize any report formats, but those that exist are select-

ed from a menu and include printing up to four labels wide. You can select label sizes, and the program includes both field and line trimming. Up to 999 copies of an individual label can be printed. Mailing List I has no text-merging capability.

Mailing List I is a good program for someone who maintains a number of small mailing lists. Its merging and reporting limitations make it difficult to recommend for larger applications, but the program includes several admirable features for storing and finding names.—Bruce Brown

#### MaiList

MailList is obviously meant for serious business. Its entry screens give room for a great deal of data, without any fills, and it allows for a wide margin of sort and selection criteria. However, it also has a few ways of making things unnecessarily difficult, and they get in the way of totally smooth operation.

Mail. Is organizes its entries through an antirecount identifier," which is made," which is made in three separate factors: a two-character user-determined Executive Code, the code, the true try number (which is automatically generated by the program), and another said by the program), and another Executive Code is required, and the Executive Code is required, and the gram will not take you to the entry screen without it. Although this might help List organize its entries, I considered it a definite hindrane.

The MaiList Customer Maintenance (entry) file allows you to enter a great deal of information. It leads off with the various identification fields, including name, company, and account identifier. After that, you can use two address fields, both of which have separate phone and salutation fields. Finally, there are a variety of twocharacter coding fields, including one labeled "Industry." four for service codes, one for occupation, and a final, 15-character field entitled Special Codes. Like several of its peers, MaiList provides these opportunities for coding under the assumption that you will remember all your various coding strategies; no provi-

sion is made for a note or reminder field.

When you want to create labels, you get
the Customer Labels screen, which gives
you your sort and selection options. You



Mail.ist is one of the few mailing-list managers that recognizes the possibility that people in a list can have both home and business addresses and phone numbers. It also has a wide range of user code possibilities.

can choose to order your list by account number, last name, company, city, state, or ZIP code; you choose to run either your primary or secondary address. You can also select by all the various coding fields that are nowided.

Mail.ist's search or "lookup" facility is a bit awkward. If you want to change an entry, you must be able to specify its "account identifier." If you don't know is, you can do a lookup, which allows you to specify up to five letters of the person's name or company name. It then lists the first name that suits the criteria, along with the next several names on your list, and invites you to enter the now-exhibited account number. Even this identification aid isn't made available if you want to dekte an entry; you must know its number first.

Mallist's report formats are all 132 columns across, and so you must enter input in compressed type. You can sort it according to account identifier, last name, company, or 21P code sequence. You can select on these or any of the coding fields, and you can also select either a full or partial listing. You'll find that labels work in much the same way.

Potential users should also be aware that this is one of those fragile programs that have "corruptible" files. In other words, if you lose power or reboot while in the add, change, or delete modes, you can badly damage your files. In this event,

MaiList's ability to use more than one file is also a helpful factor. However, those who do not need such an elaborate coding system would probably find MaiList less useful than some of its friendlier peers.—Barbara Krasnoff

SEASON PORTON

#### Mailtrak

TCI Software's Mailtrak is a nicely efficient mailing-list manager that may not be quite as polished as some other products reviewed here, but shows a great deal of foresight into customer needs.

Although the product is titled Mailtrak, it is actually made up of several programs: Mailset, which sets the programs parameters; Mailtrak, which is the main entry and editing program; Mailsort, which creates user-chosen indexes; and Mailout, which handles data output.

mandes and corput.

Medilands can give users more Medilands can yellow program. The input screen not only includes the usual first-name, list-name, and address fields, but also contains two phone number fields, but also contains two phone number in the program of the saccinated country to the printed address, and nine three-character numerical coding fields. These include five fields designated Mail Code.

Code fields, which come with associated country and address, and nine three-plants of the control of the saccinated control of t



ager with enough facilities to recommend it to more small business users. Change of names and sending of first names allowed in coding. Not copy protected. CRICLE 674 ON PEADER SERVICE CARD



facilities; others may find its insistence on an

'account identifier' an avoidable nussance.

Account number with two two-digit fields for

coding. Not copy protected.



Mailtrak provides users with a full range of select and sorting options, as illustrated by its many Mail Code and Act.Code fields. Note the "department" and "salary" labels; these were added by the user.

remind users of what their codes mean, a situation not helped by the numbers-only format. Some kind of note or help screen in this regard would be helpful.

Besides a flexible label print function, Mailout gives you a choice of two report formats: a complete listing or a nicely planned telephone list that allows you to choose whether to include a full address, to complete listing the function gives users a variety of choices, including numbers, or a title. Its label function gives users a variety of choices, including number of lines, whether to include record or phone numbers, the number of copies, etc. You can also type in a short message. Allbugad he programm values to the control of the programm values of the control of the complete lines, you can decide which lines you wish printed by entering the appropriate line numbers in a special "line order." area.

It also proves flexible in the area of sorts and selects. When you run your flex through the Mailsort program, you are actually creating a second index for the file that has been sorted by up to five fields. Thereafter, you can choose to display or print your file in either entry or sort order. You have considerable latitude in selections; you can choose to select on first

 Mailtrak should be especially attractive to those with smaller

systems.

name, last name, city, state, ZIP code, country, or phone area code (or a combination of these) on a greater-than or less-than (but not equal-to) basis.

Mailtrak does have a few small bugs, most of them attributable to its lack of polish. For example, on several of the select screens, the cursor keys will produce ters, and it is possible to inadvertently erase the on-screen formatting of the phone fields (although this does not affect the printouts). In addition, I was not extraordinarily fond of the entry deletion facility, which simply marks an entry as deleted and never really removes.

nice program. It should be especially attractive to those with smaller systems, since it only needs 64K bytes of RAM for floppy disk drive machines and 128K RAM for PC-XTs, but its flexibility and reponse to user needs should recommend it to a wide audience.—Barbara Krasnoff

#### MBS Mailing Label Program

If one of the justifications for mailing-list managers is their case of use, then the MBS Mailing Label Program from MBS Software doesn't quite make the grade. This software package is extremely versatife and can be adjusted to suit quite a number of user needs. However, if you intend to the give it to a computer novice simply to enter the data, you may want to spend a little time with it womself first.

MBS comes with two disks: a setup disk, which runs your computer through a preparatory procedure, and the main system disk. The first time you start the program, it runs you through a quick file that configures the program for your hardware setup.

The MBS input screen must be one of the most complete that I've come across. It automatically indexes on a primary and secondary name field (if you want to index on a company name, you can put it in the





Although MBS Mailing Label Program is not easy to master, it can be adjusted by more experienced users to suit individual needs; for example, the user code help file was designed to reflect the coding created for this particular file.

primary field). Other available fields include a designation field (for titles such as Dr. or Mr.) a field for title or contact name, two phone fields, and a separate field for typing in the name that will appear in the first line of the label. Besides the usual address fields, you'll also find a long note field for remarks, a "type of address" code (for country codes), and three twocharacter user coding files.

Once you have typed in your entry, MBS takes you through several checkpoints along the way-enough to become irritating. It not only stops you after you've added the two sort names to ask if you're sure you've entered the right information, but it also takes you through three more "are you sure?"-type questions once you've hit the end of the entry screen. The program's elaborate method of se-

lecting entries to print also takes a bit of getting used to. Once you've gotten past the rather confusing screen setup, MBS allows you a large selection of comparative criteria, including equals, not-equals, and greater-than/less-than

You also have a great deal of latitude when printing out labels or reports, includ-

ing creating new formats, changing existing criteria, and recalling the most recently used selection criteria. However, unless your needs are satisfied by MBS's preprogrammed formats, you will have to go through the manual very carefully before

you can put together your own. MBS's major advantage is that you can change anything in the program-including entry screens, report formats, and help messages-using the program's query language. Although this gives the program as much flexibility as anyone would want, it also increases the difficulty factor. This is definitely not one of those programs that you can just slip into the disk drive and run-it takes a bit of work and learning time, and you've got to be prepared to spend that time to take full advantage of the program.-Barbara Krasnoff

#### NamePro

#### Business needs can vary, depending on whether you are part of a large, interna-

tional corporation, a national firm of several hundred employees, or a small, local concern. NamePro is a clear, easy-to-understand mailing-list manager that is ideal for those in the last category.

In fact, NamePro's main purpose is to produce a portable address list that will furnish sorted name, phone number, address, and comment listings for a small, pocketsized notebook. As a result, it is somewhat limited in scope-NamePro creates only one data file, which holds up to 1,000 entries and assumes that your data is on the same disk drive with the program.

The main menu is set up in a clear, easy-to-understand manner. The numbered data functions include add, change, delete, inquire, model (which provides a "ditto" function and also allows you to create simple templates), and print. You can also order up a 19-screen help facility, as well as handy listings of state ZIP codes and telephone area codes. The function

#### NamePro's limited capacity restricts it to the category of personal software

keys are put to use predominantly as help keys; they are listed on the right side of the screen and are associated with similarly numbered mailing-list tasks. For example, the F1 key will call up a help screen for task number 1: Add.

The program gives you the choice of entering your data in three different formats; personal, business, and notecard, There are very few differences between the first two: a personal entry has separate lastname and first-name fields, using the former as the key field, while a business entry has a distinct key field and a single name field. Otherwise, they both share three address fields, one phone number field, an eight-character category field (that can be used to select on), a re-sort field (that can contain information that you may alternatively wish to sort on, such as a ZIP code). and four comment fields. The notecard format contains key, category, and re-sort fields, along with seven comment lines. It is mainly useful as a user-created help

#### ■ MAILING-LIST MANAGERS

| tefano                | Functions  |
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| 25880                 |            |
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| HEREAL                |            |
| Correct               |            |

NamePro's personal address entry screen sorts automatically by the last-name field. Users can also opt for a business listing, which sorts by a key word, or a note field.

file—for example, a listing of user codes that will be printed out at the end of a file can be created here.

The delete, change, or inquire functions work in a nicely instinctual fashion. When you choose any of these services, you are given a selection menu that lets you find the desired records by a variety of keys, including last name, whole or partial key

words, or the category code. You can also choose to see separate listings of personal, business, or notecard entries, or combinations of these.

The printing function works equally well. There is a large enough variety in either the label, address book, or single-sheet formats to satisfy most user needs, and you can select on either category codes or entry formats.

Unfortunately, NamePro's limited capacity restricts it to the category of personal, or perhaps small-business, software. However, manufacturers of more extensive mailing-list managers could take a few lessons from this product on how to present a neat, well-organized package.—Barbara Krasnoff

#### CENTER 12 1/20

Oxford Mailworks
Oxford Mailworks is an impressive combination of sophisticated graphics display
and efficient mailing-list management. In
fact, its screen presentation is probably the
best of all the programs in this survey and

adds immeasurably to its ease of use.

Esselte Pendaflex Corp. is so confident of the program's ease of use that it does not include a printed manual with its disk, but simply encloses a card that explains how to

copy and start the program. Instructions are obtainable beginning from the first screen, where you have the choice of entering the program or going through the instructions and into each segment of the program. It even includes a tree directory to let you know where you are in the program. (If you really are helpless without a manual on your deek, there is an option to print out the manual.)

organized. User data is contained within two framed areas. The first contains basic address information, headed off by the sort line, in which a last-name, first-name convention is followed. It is followed by three address lines (the first of which contains

#### Oxford Mailworks is an impressive combination

of sophisticated graphics display and efficient mailing-list

management.

the name as it should appear on your listing), and separate city, state, and ZIP fields. The second area includes phone and comment fields, an "action date" field, and four 10-character keyword lines.

Meanwhile, the upper-right-hand side of the screen contains information such as the date, filename, date of last edit, and number of records. Along the bottom of the screen is a menu of available functions, most of which are accessed by hitting single keys.

You can search on several fields, including the sort field, city, state, ZIP code, phone, action date, and a keyword.

The Oxford Mailworks list of printout forms is one of the most complete available. Thirty-four in all, they include continuous labels of various sizes, clear labels, photocopy sheets, envelopes, mailing labels, name badges, file cards, postcards (including automatic change-of-address forms that print your old and new



List Price: \$29.95 Requires: 128K RAM, one disk drive, DOS 2.1 or later.

In Short: A very clear, well-organized mailing-list manager that includes a pocket-sized address book, but that is too limited for serious business use. Several comment lines, one category and two resort fields for coding. Not copy protected.

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Oxiond Mattworks makes it simple to search for fulle Williams's entry using the "?" as a wildcard, choose to print it out as a single-spaced continuous label, specify exactly which lines you want to appear on the label, and add a generalized message.

address, or a common message), selfmailers, two types of summary listings (one condensed, the other full), and a userdefined form that will print one-across

The printing process takes you through three steps: form, setup, and print. First, you pick which type of form you want (it automatically defaults to the last type used); then you may choose a specific setup for that form—for example, single or

FACT FILE Oxford Mailworks, Version 2.2 Mailworks Esselte Pendaflex Corp. 71 Clinton Rd. Garden City, NY 11530 (516) 741-3200 List Price: \$49.95 Requires: 256K RAM, one disk drive, DOS 2.1 or later In Short: A well-organized and versatile product which provides users with a variety of easily accessible label and report formats One comment, two four-keyword fields for coding. Not copy protected. CIRCLE 673 ON READER SERVICE CARD

double spacing, which fines to print, whether or not to print a return address or a common message, and whether you want to set it up for bulk mailing.

Oxford Mailworks is an impressive piece of software. One of the main reasons for choosing a mailing-list manager over a database is to be able to dive in, enter your data, and print it out in an appropriate format with little or no learning period, this package fulfills these criteria admirably.—Barbara Krasnoff

#### The state of the s

#### Super Base and Super Mail

PMC Software's two mailing-list management programs, Super Base and Super Mail, are good examples of the type of modest software products that are still being produced by small independent software companies. As such, they are solid programs with some limitations that may inhibit their use by lareer firms.

Super Base, the more complex of the two, is geared toward the needs of a sales staff, but is flexible enough for most uses. its entry screen contains fields for company name, first and last name, address, phone, dates of last purchase and last mailing, and alternative billing address. There is also a contact field and a terms field, the latter can be used for any type of user coding. Super Mali is much more limited and contains only fields for company name, first and last name, and mailing address. It doesn't even allow for a phone number field, which is unusual even for simple mailine. Bist managers.

Both products also contain account number fields, which are considered required fields. The account number is entered manually by the user before the entry screen appears, which can slow your entry speed considerably while you try to remember which account number you'r eu to However, according to PMC Software, a new version of the program that may already be out will not require the account number and will also have the ability to generate it automatically.

Most of the functions in each program are accessed from the main menu. You can choose to add, find, change, or delete an entry, generate a printed list or mailing labels, create or change a password, merge names with a word processor, or browse, This last is the easiest way to find information, since it allows you to search for an entry by all or part of a last name, city, state, ZIP code, or terms (the user-coded field). In fact, it is the only way to find any entry if you can't remember the account number. Thus, if you want to change or delete a name and can remember only that the man's last name is Smithers, you must first find it using Browse, then go back to the

main menu and enter the correct number. The process of printing out a customer listing is very cut and dried: the listing is automatically generated in last-name order and immediately printed without much fuss. Super Base allows you more leeway in selecting which labels you wish to print. From the main menu, you can choose to print entries by selecting specific ZIP codes, terms, or customer activity. The latter allows you to choose entries with filled or blank purchase date fields, or with specific purchase dates or mailing dates. Super Mail is again more limited here, printing only mailing labels in their entirety or by selected ZIP code.

a- Super Base and its companion include a

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#### ■ MAILING-LIST MANAGERS



small extra facility: a little RAM-based notepad that appears in the upper-right-hand comer of the screen. It's a nice idea, but it doesn't work very well: the note takes a bite out of the entry screen when it is invoked, and the cursor tends to get lost if you try to type past the lower border of the notepad.

Of course, it would be unfair to expect highly sophisticated performance from software that costs \$25 and \$35, respectively. When that irritating account number has been eliminated, the two programs may well be inexpensive alternatives for those with limited needs

# -Barbara Krasnoff Super Mailing List

Look—up at the screen. It's a procedure ... it's a routine ... no, it's Computer Solutions' Super Mailing List, which, disguised as a mild-mannered application developed in BASIC, is able to select and sort records any way you want it to. Super Mailing List gives the appearance of having been developed by a hobbyist, but for the list price of \$14.95, you can hardly so

wrong.
Several of its features would be appreciated in some of the more-expensive programs. Super Mailing List is designed to run on a floppy disk computer system, although you can install it in a hard disk drive subdirectory. With floppy disks you need first to format a bootable disk and

then copy the supplied program files as well as the necessary BASIC program files onto the disk. Then when you start the computer with the Super Mailing List "working" disk in drive A:, the program boots automatically.

To use Super Mailing List with a hard disk drive you should be sure that your star-up path includes access to BASIC and then work with the program's files all loaded in their own subdirectory. If you issue the command AUTOENEC BAT in that subdirectory, Super Mailing List will start automatically. All you need to do to configure Super Mailing List is to tell the program which is your data disk.

Super Mailing List comes with nine typed pages of documentation. If the manual were fleshed out a bit with illustrations, the content presented would probably take up 25 to 30 pages in a fancier manual. It is reasonably complete, limiting itself for the most part to the major functions and spending some time with the conditional query

language.

Super Mailing List's entry screen lists the fields vertically. In addition to the expected fields for name, address, city, state, ZIP code and phone, there are also a company field and a greeting field. The greeting field is used to store a preferred salutation for your letters.

The program includes eight coding, or "flag," fields, labeled Flag1, Flag2, and so on up to Flag8. You can use these fields to select records with Super Malling List's conditional query language, which uses



PMC Software offers a small, RAM-based notepad that can be used in conjunction with both its mailing-list managers, Super Base and Super Mail. Super Base, shown above, is the more complex of the two.





Super Mailing List's entry screen makes a minimal effort to be pleasing, but it's better than those of some of the more expensive programs.

And, Or and Not relationships. You can then sort selected records by any field. This level of selecting and sorting is very possible to the feed and sorting is very possible to the selecting and sorting is very possible to the selection of the selection of the top of the selection of the selection of the top of the selection of the selection of the top of the selection of the s

When you run the program, you select a full functions by typing single-letter commands chosen from a simple horizontal menu displayed on the bottom of the screen. Printing options are limited. You are basically limited to printing the current screen or standard 3½ by "wi-inch mailing-labels one across" ("one-up"). Super Malting Lett runs well but doesn't want to te toy up. O' on but so to hit the Earte to you go. To what to hit the the run of the toy up to the proper of the property of the

I had no major problems running Super Mailing List. Its user interface has limitations, but it gives the best price performance of all the programs I reviewed in this series. If you're in the market for a mailing list and have the time to do some research, I'd suggest that you buy this program and try it out. Even if it doesn't meet all of your needs, you can learn a good deal about searching and sorting. Since it includes the ability to output an ASCII merge file, you should be able to import entered data if you later find you need to use a fancier program.—Bruce Brown

#### Traveling SideKick

Traveling SideRick, from Bortland International, is possibly the first truly yuppic software package. It comes with one of those oversized appointment books that have become all the rage, with little pockes for business cares and calculator and extensive properties of the control of the dresses, receipts, and any other notes yet need. But although the emphasis of the package is on its ability to generate address and appointment lists formatted especially to fold into the binder. Traveling sideRick also contains an efficient and smoothly op-

Traveling SideKick works through a series of pull-down menus. The opening screen offers three categories to choose from: Addresses, Engagements, and Set-

up. Addresses allows you to enter, find, change, and remove addresses, sort according to name, company, or ZIP code, and generate either phone or address listings (for the appointment book) or mailing

■ Traveling SideKick, from Borland, is possibly the first truly yuppie software package.

labels. Engagements allows you to use the program's calendar facility. Setup lest you change the default setup—for example, you can change your default files, the number of labels across, and the number of lines down per label (6, 9 or 12). You can also change your printer format to specify mean-letter-quality or compressed type, but you have to know the control codes (those for the Epson or IBM are included in Bortont England or IBM are included in Bortont England (e.g., 2001).

land's manual).

Traveling SideKick's data entry screen is divided into two windows. The top window contains the entry form, which includes fields for initials, name, company, address, country, one phone field, a free field titled Remarks, and an automatic data field. The bottom exhibits a shortened list of existing entries. If you want to view an extending entries. If you want to wise was considered to the control of the control of the control of existing entries. If you want to view and the control of the control of the control of existing entries. If you want to view and the control of existing entries. If you want to view and the control of existing entries. If you want to view and the control of existing entries with the control of existing entries. If you want to view and the properties of existing entries with the control of existing entries. If you want to view and the properties of existing entries with the control of existing entries. If you want to view and the properties of existing entries are the properties of existing entries. If you want to view and the properties of existing entries are the properties of existing entries. If you want to view and the properties of existing entries. If you want to view and the properties of existing entries. If you want to view and the properties of existing entries. If you want to view and the properties of existing entries. If you want to view and the properties of existing entries. If you want to view and the properties of existing entries are the properties of existing entries. If you want to view and the properties of existing entries are the properties of existing entries. If you want to view and the properties of existing entries are the properties of existing entries. If you want to view and the properties of existing entries are the properties of existing entries. If you want to wa

Unlike many of the other mailing list managers, Traveling Sidektick includes a very efficient conversion program that alword me to pick up entires from either a specify which fields should be picked up, which fields should be picked up, when enter my 25-name list with no fuss whatever. There was also very little bother involved in printing out labels. Once you have choosen Labels from the pull-down which was not to be a supplied to the property of the proper

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#### ■ MAILING-LIST MANAGERS



Et halp PS: find ( or Yé-vieu II 4 preu/mext Del I delete PSC-poit Traveling SideKick's conveniently formatted input screen allows you to simultaneously view previous entries. By scrolling through the names on the lower half of the screen, you can update.



repeat, or delete entries with little or no fuss.

Inc. 4585 Scotts Valley Dr. Scotts Valley, CA 95066 (800) 255-8008 (800) 742-1133 (in

List Price: \$69.95
Requires: 256K RAM, one disk drive, DOS
2.0 or later.
In Short: Traveling SideKick is a good, efficent mailting-list manager for those whose
needs are limited to address labels or who
want to take advantage of its calendar facility.
Remarks column for codine. Not copy pro-

only). You can print up to four labels across in normal type.

tected.

The program gives you three sort choices: by name, ZIP code, or company. This is where *Traveling SideKick* presents a problem for business users: instead of senarate first- or last-name fields, it contains only a single name field. Thus, the only way you can sort according to last name is if you type your entries in a last-annee, first-name format; your labels will also be printed in that format. Additionally, since both the phone and address lists are formated for the Traveling Side/Kei binder, they are not really situable before any type of independent reports. And Version (DOA is limited to 310 address entries; the property of the prop

If you simply need a quick and easy way to enter addresses and produce labels (and especially if you like the idea of using your computer as a personal secretary), Traveling SideKick is probably worth a look.—Barbara Krasnoff

Bruce Brown is a principal at Soft Indusries, a Connecticut computer consulting firm. He is the founder of the Connecticut Computer Society and has staught business uses of computers at various area colleges. Barbara Krasnoft is a former associate editor at PC Magazine. She is the author of numerous articles on computers and robotics.

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# COMPUTING

grams have recently emerged as a new category of communications software. two computers for transferring files and typing messages back and forth, as well as for running tions programs run on the host

emote operations pro- applications programs-including spreadsheets, databases, and word processors.

Typically, with remote opera-These programs let you connect tions programs one computer acts as a host and the other as a remote terminal. The applica-

Remote computing-no longer as remote as it used to be-lets people at widely separated computers collaborate on the same project.

computer, but they can take orders from both the remote and host keyboards and send information to both the remote and host screens.

Remote operations have two discrete elements—the host side and the remote side. Furthermore, the software for the host side can handle the remote side in two different ways: talking only to a specific program as do Clars-Up and Carbon Copy, or talking to just about any terminal or communications program, as do Remote and PC Anywhere. All Termote operations packages provide host-side software, and most of the ones reviewed here provide specific remote-side software as well.

#### A less obvious but more interesting possibility with remote operations software is cocomputing.

If the software is designed to talk only to a specific program, it is easier to take maximum advantage of both host and remote systems. Among other benefits, file transfer and real-time transfer of keystrokes and screens can use efficient portrietary error-checking protocols, and data-compression techniques can be used to speed things, vi Also, if the remote side is familiar to the host, graphics and color are far easier to send.

The dovious use for remote operations programs its to operate your computer from a distance—from home, a hotel room, a client's office, or wherever there is a remote terminal. A less obvious but more inneresting possibility is eccomputing. Since both keyboards remain active and both screens show the same thing, two people at widely separated computers can work on the same spreadsheet, word processor, or database report, with each person seeing all the changes the other one makes.

In addition to long-distance collaborations, cocomputing provides a valuable support tool for computer consultants and the office computer guru. Simply put the host-side software on your customers' ma-

chines. Then, when a customer has a problem, he just calls your computer. Using the remote-side software on your computer, you can either control the applications program on the host computer and correct the problem while the customer watches, or have the customer show you the problem he is having.

WHY IS REMOTE DIFFERENT? The remote operations capability is not new, you'll find it in some general-purpose communications programs, including AS-COM IV and Crosstalk XVI. But aside from being one of the least-used features of these programs, it is also an extremely limited one.

The remote operations feature on general-purpose communications programs will let a remote caller run DOS commands and, in most cases, applications programs on the host system. But in practice, the caller is limited to well-behaved programs, meaning those which go through DOS for screen output rather than talking to the hardware directly. With welt-behaved programs, the communications program can read the data going to the screen and redirect it out the communications port so that the remote caller can see it. The problem is that WordStar, 1-2-3, and most other popular programs are not well behaved. They run on the host system but don't send their screen output through DOS; therefore, the communications program won't see the screen output or redirect it to the comm port. All of this means that the applications program is effectively hidden from the caller.

Fortunately, screen output can be redirected to the comm port, even from programs that are not well behaved. Most of the new remote operations programs take advantage of this capability. (It is also possible to sidesep the issue of screen transfer by sending only keystrokes back and forth. For a description of In-Synch.") a program that does this, see the sidebar "Computing in Concert with In-Synch.")

IN GENERAL Some general observations emerged when we tested the remote operations programs. First is the issue of real-time conversation while the computers are communicating. Except for unattended host operations, the most desirable way to

nn ermote programs is to have two phone. If only one phone lines open, one for voice and noe for distinct only one phone line is available, it is useful to have a way to the beat and forth without disturbing data communications. Except for white the contraction of the proper of the contraction of the contraction

A second issue to consider is whether you want to document on-line sessions and, if so, how. There are at least two kinds of documentation, and they show up in these programs in various combinations. For example, you may want the program to create a log for billing and at xpurposes, showing what you did and for how long, or you may want to capture the actual session to disk for later review—either as a series of individual screens ("slides") or as an entire session for a "movie").

as an enture session (a "move").
This second kind of documentation
could be particularly helpful if you are providing support for a chent. It lets a minimally trained employee take a first crack a
solving a problem without wasting the
cle mi's time. If the problem requires more
expertise, the recorded session will usually
have enough information for a bettertained employee to solve it later, without
forcing the client to go through the problema second time.

The third issue is speed. At 1,200 bits per second, none of the programs reviewed here (except for In-Synch) is better than tolerable. At 2,400 bys, they are all usable and may provide the best argument to date for buying a 2,400-bys modern. Because 2,400 bys is the minimum acceptable speed for these programs, all the remote communications screen transfer performance tests were run at that speed.

As you might suspect, the programs did even better at 4,800 bps. Suprisingly, however, at 9,600 bps they all did miserably. Even with the bost and remote computers connected by cable back to back, PC Anywhere and Remote introduced far too many random errors, Carbon Copy inserted a significant number of errors remote the form of the property of the

and 6), and Close-Up slowed down significantly from its performance at 4,800 bps.

When connected through a Fastlink 9,600-bps modem over a real phone line, Carbon Copy did better than when connected computer to computer by cable, but it still inserted errors, mostly the numbers 5 and 6. (This is definitely Carbon Copy's fault. I've used Fastlink modems before, and they just don't introduce errors.) Close-Up with Fastlink makes a connection, then apparently dies. The first time I connected, however, I did get most of the first screen before it died. When PC Anywhere was used with Fastlink at 9,600 bps, the screen updates tended to be filled with blocks of white space-text spaces in reverse video-and the remote keyboard was often dead.

In short, none of the programs reviewed worked at 9,600 bps. If you're thinking of using any of them as a remote terminal to your PC or AT, be aware that 4,800 bps will be your too speed.

As of this writing, there are few remote operations programs, but the number is growing. Two of the four programs reviewed here weren't available a year ago. The third, Carbon Copy, has recently undergone major revisions that add important new features. The competition is heating up, and the quality of the software is improving dramatically.

### Close-Up

Closs-Up. from Norton-Lambert, takes the specific-program approach in that it is designed to talk only to one remote program. Norton-Lambert sells both the host program and the remote program in separate package:

In Clore-Up terminology, the bost-side program is the "customer" program and the remote-side program is the "support" program. As the names indicate, the program is geared toward remote-support applications, with special features allowing the remote side to tum off the host keyboard (to keep the customer from interfering with what the support side is doing) and allowing you to record individual serens (sides) or full sessions (movies).

An interesting oversight arising from the bias toward support applications is that only the support side can generate a log of



Close-Up, Version 1, 10
Notion-Lambert Cop.
P.O. Box 4085
Santa Barbara, CA
93140
(805) 687-8896
List Price: Customer

program, \$195; support program, \$195; support program, \$245.

Requires: 36K RAM, one disk drive, DOS 2.0 or later.

In Short: Close-Up's greatest strengths are careful attention to detail and consistency of

commands. Despite its somewhat slow screen-transfer rates, Close-Up's case of use makes it the program of choice for most support applications. Not copy protected (checks serial number).

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calls, on the assumption that you'll need this for billing information. If you're interested in setting up a host, however, you'd probably prefer a log on the customer side so you could see who used your system and when. Although this bias shows up in other ways as well, the program is still usable for other applications.

As with most remote operations softare, Close-Up is a memory-resident program. The customer (or host) side loads Close-Up into memory—typically through an AUTOEXEC.BAT file so that the program will always be available—and then goes about his or her business on the computer. If a problem crops up while using an applications program, the user can bring up (Close-Up) with a box key and esbring up (Close-Up) with a box key and esport side, all whout leaving the applications reoveram.

Once communications are established, the host side can drop back to the applications program. The computer guru on the support side can immediately see the probem and demonstrate the solution from his or her keyboard, dropping back to DOS or oven running another program. Once the problem is solved, the two Close-Up programs disconnect and retreat to the background, and the customer can pick up where he or she left off

program is almost entirely self-documenting. When you load it, it comes up with a short help screen that tells you how to move around within Close-Up menus, make selections, exit the menus, and call up the menus in the first place. This last information is particularly helpful to have, since the hot key is redefinable and you can't use the program if you don't know how to bring it up.

The menus use a point-and-shoot command structure, with most of the command structure, with most of the commands being reasonably self-explanators, its choices: Phone, Setup, Display, Keys, IE, and Print. Browsing through the pulldown menus for each of these will tell you most of what you need to know about the program. The Print menu, for example, gives you these options for sending print date. Local Only, Transmit Only, Local and Transmit, or Ignore.

The manuals also deserve special mention for the thought that has gone into them. To begin with, there are two—one for the customer program and one for the support program. Much of the information is identical in both, but separating the instructions climinates the confusion of trying to explain both programs at once. Both manuals are well organized, well written, and complete; they answered all the questions I had about the noveram.

Close-Up can be used to turn a computer into an unattended host for remote callers. In this situation, the memory-resident feature is irrelevant: you simply load the program and leave it set to answer the phone. For use as an unattended host, the program offers password protection, with one password for all users. An additional level of security comes from Close-Up's use of proprietary error-correction and data-compression schemes, which means it won't talk to anything but another Close-Up program with the same encryption scheme. For example, the evaluation units provided for review wouldn't talk to the production units. Customized versions of the encryption code are available.

Once connections are established between the host and remote computers, Close-Up becomes largely invisible. The host computer works just as it always does, except that it has a remote terminal attached to it. And the user can do anything

#### ■ REMOTE COMPUTING

Remote Communications Software: Summary of Features

| Preduct<br>Menufecturer                                                    | PC Anywhere<br>EKD Computer Sales<br>& Supplies Corp. | Cerboe Copy<br>Mendian Technology             | Remate<br>Microstul Inc.                   | Cleee-Up<br>Norton-Lembert Corp.                                                     |
|----------------------------------------------------------------------------|-------------------------------------------------------|-----------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------|
| List price<br>Copy protected<br>Talks to:                                  | \$99  Most terminals; comes with ATERM                | \$195  (checks serial number) Specific remote | \$195<br>O<br>Most terminals               | \$195, customer;<br>\$245, support<br>O (checks seriel number)<br>Specific<br>remote |
| Works with:<br>Host is password protected<br>Host creates log              | SideKick, ProKey                                      | SideKick, ProKey                              | ProKey  •                                  | ProKey  O                                                                            |
| Remote creates log<br>File transfer protocols<br>Data compression          | Xmodem                                                | Proprietary                                   | O*<br>Proprietary (Crosstalk)<br>or Xmodem | Proprietary                                                                          |
| Host can call remote<br>Remote can call remote<br>Direct-connection option | :                                                     | :                                             | 0                                          | :                                                                                    |
| Printing locations<br>Captures single screens<br>Graphics support          | Host or remote                                        | Host end remote                               | Host<br>O                                  | Host and remote  (remote side only)                                                  |
| Chat window                                                                | •                                                     |                                               | 0                                          |                                                                                      |

at the remote terminal that he or she could do at the host computer, short of adding paper to the printer.

The near invisibility of Closs-Up is as it should be, and the flaws in the program emerge when the invisibility is lost. For example, when using an EGA at the host and a CGA at the remote location, the cursor gets lost en route. (This is not a problem with a monochrome monitor at the host and a CGA at the remote location.) In most applications, I could still navigate around the screen by dead reckoning, but the extra effort pot in the way.

un. The signified good services difference between working at the host and working at the remote location is speed of screen updetect. Clars-Up ires to case this problem by providing a full-speed mode in which he host will operate without waiting for the second second second second second stage. Even so, at 1,200 bps, keystrokes have a slugglar bespone and scredilistic spainfully slow. On the performance test, a time. Class-Up took 14 seconds to transfer to a ceremital of each of the second second second and the second secon

screen when scrolling a single line because the program sends the whole screen each time.

The screen transfer rate is similar for 1-2-3, but the frustration level is higher. When word processing, you can type ahead of your screen for short bursts; with spreadsheets, you have to wait, since it is too easy to move your cursor past the target cell

At 2,400 bps, things improved significantly. The screen transfer rate dropped to 6 or 7 seconds, and although the keys were still notably sluggish, WordStar and 1-2-3 became usable.

The performance tests also put the program through its paces at 4,800 bps with a direct connection and at 9,600 bps with both a direct connection and the Fastlink modern. Surprisingly, 4,800 bps made only a marginal difference, dropping the screen transfer rate to about 5 seconds. And at 9,600 bps, the timings actually got

At 9,600 bps with the computers directly connected, I found long gaps between typing and response. Several times I thought the connection had died, when

suddenly the system processed my last keystrokes. After that, the connection seemed to die again. In one case I waited 25 seconds between sending a command and seeing a response; in another I waited over 2 minutes before giving up. Tests with the Fastlink were similarly disap-

pointing. All this makes Close-Up unusable at 9,600 bps.

The text screen transfer looks positively speedy next to graphics screen transfer. At 2,400 bps, the graphics screen used in the PC Labs tests took 1 minute and 45 seconds in regular graphics mode. The fast graphics mode, which cuts down resolu-

tion, took 55 seconds.
In tests with other RAM-resident programs, Closs-Up performed well with ProKey on the host side but had a curious problem with SideKick. It was hard to call SideKick up from the remote location: I held the Ctrl-Aft key combination down the normal length of time, and nothing happened. When I held if the took too long,

the hock to sleep.

Close-Up's screen transfer rates are neither the best nor the worst of the programs.

### COMPUTING IN CONCERT WITH IN-SYNCH

At first glance, In-Synch seems to be in the same category as Close-Up, Carbon Copy, Remote, and PC Anywher. All these programs the two computers together so that both keyboards are active and both seems show the same thing. However, instead of running an application; program on one computer and sending information to the other. In-Synch runs the same program on both computers simultaneously, sending the computers simultaneously, sending the

keystrokes in both directions.

The approach In-Synch takes to dual computing has two immediate effects, one positive and one negative. Because it sends only keystrokes, In-Synch is much faster than the other programs. Even at 1,200 bps and even using graphics applications, there is no noticeable delay. Any given operation is limited only by the speed of the slower computer.

what you give up for speed is remote operations capability. With InSynch. The control of the con

Like Carbon Copy, Close-Up, and PC Anywhere, In-Synch is a memoryresident program. To use it, you load the program, log on to the appropriate disk and directory (on both sides), call up In-Synch and establish communications with the other computer, drop back to DOS (on both sides), and load the applications program (on both sides). Alternatively, you can load the applications program before calling up In-Synch. In-Synch assumes that although both computers are using the same applications program, they do not have identical data files. Therefore, as soon as communications are established, the program



In-Synch
American Video Teleconferencing Corp.

110 Bi-County Blvd. Farmingdale, NY 11735 (516) 420-8080

List Price: \$295 for single program, \$495 for twin pack (two copies).

Requires: 128K RAM, one floppy disk drive. DOS 2.1 or later.

IN Short: A communications package that runs the same applications programs on both ends and sends keystrokes in both directions. Not copy protected. GROST BROWN PEACH SEPPLES CAPO

presents the transfer data menu.

In theory, with In-Synch two computrusers at a gread distance from one another should be able to establish communications, transfer the appropriate data file, run the applications program at full speed, and end up with two identical data files. If they have a second phone line, they can talk while working at the keyboard. Working at long distance should hardly be different from working in the same room. Unfortunately, the program doesn't live un to its reomise.

Memory-resident programs are motirous for thrigh computers to a sudden halt or interfering with programs that work fine when It alone, and In-Symois to exception. One of the worst problems is that the program chokes on a Cit-C. Whenever I loaded In-Symh, gave the command to type a file, and the CT-C. while the file was printing to screen, the program crashed. I also had problems commands, which have ever trapped to the computer of the computer of the comcommands, which have ever trapped to commands, which have ever trapped to commands, which have ever trapped to make the command of the computer of the comtraction of the command of the command of the comtraction of the command of the command of the comtraction of the command of the command of the comtraction of the command of the command of the command of the comtraction of the command of the command of the command of the comtraction of the command of the command of the command of the comtraction of the command of the com

Far more troublesome was that In-Synch often got out of sync. For example, I overran the keyboard buffer while scrolling through a 1-2-3 worksheet. It urns out that the local side loses the extra keystrokes, but the remote side receives them and acts on them. To get the screens coordinated again, you only have to hit the Home key, but until you do, any formulas or data that you enter will go into the wrong cells on the other side.

GOOD SLIDE SHOWS What In-Synch does very well is slide-show presentations. The program can capture any text or graphics screen of any software that will run with it. Once the slide is captured, you can change colors, draw boxes, type text, or highlight any portion of it. You can then assemble groups of slides into presentations and view them on your own system, even without being linked to another computer. Or you can call another computer, establish communications, transfer a presentation file you assembled previously, and show the slides on the remote computer. The highly efficient data-compression scheme used by In-Synch speeds up file transfer and makes the waiting time tolerable.

This presentation capability is what distinguishes In-Synch from other remote operations programs. American Video Teleconferencing Corporation, which designs and installs videoconferencing facilities, is primarily interested in teleconferencing and considers In-Synch to be a desktow videoconferencine product.

My impression of In-Synch. Version 1.03a, is that it hasn't been beta tested thoroughly enough. The slide annotation and presentation capabilities are impressive, as is the speed of file transfer. But in the performance tests, these capabilities were the only features that worked without obvious problems.

According to an AVTC representative, many of the problems I ran into Mill be fixed in the next release of the program, which I look forward to seeing. It would be rites if In-Sporth lives up to its promise.—M. David Stone

### IBM's new 2,400 bps PC Modems give you an easy choice:

## Either

Stand-alone. The IBM 5842 2,400 bps Modem.



Either way, you can't go wrong.

With IBM's new modems and a personal computer you can tap into information at a very impressive 2,400 bits per second (bps).

That translates into a binary file transfer speed of nearly 13 K characters per minute— or over six pages worth. Now imagine the impact that can have on your long distance telephone bill.

But these new modems aren't just fast, they're also versatile. They can both send and receive data asynchronously at speeds ranging from 2,400 bps down to 75 bps.

Both modems are compatible with the popular "AT" command set, as well as the IBM command set. And they have been tested for compatibility with leading PC communications software such as Crosstalk" XVI, Microsoft\* Access, Kermit, Smartcom" and Smartcom II\*

The Automatic Modems These modems feature Automatic Adaptive Equalization at 2,400 and 1,200 bpswhich means they will continuously fine-tune themselves to compensate for changes and noises on the telephone line. The result is, you can receive data over a wider range of telephone line conditions.

Both modems also feature automatic or manual answering and dialing. They'll automatically switch to pulse dialing if tone dialing doesn't work. They have automatic redialing. And once a connection is made, automatic speed detection. They also have automatic detection of a voice or a failed call.

A Modem with a Memory of Its Own The stand-alone IBM 5842 2,400 bps Modem offers some additional features. It can also send and receive data synchronously at speeds of 2,400 bps or 1,200 bps. You'll find extensive "Help" menus. A dial directory for 20 phone numbers. A log-on directory for five log-on sequences. A built-in pattern generator for self testing. Diagnostics implemented from the front panel as well as from the computer keyboard. And a complete array of LED Status Indicators to give you a quick visual check on what's happening.



Which One Is for You?

The internal IBM Personal Computer 2,400 bps Modem is designed to occupy a half slot in the IBM PC, XT, AT and 3270 PC.

The stand-alone IBM 5842 2,400 bps Modem is compatible with all models of IBM Personal Computers. And, in addition to the features mentioned above and its internal power supply, the significant difference is that a stand-alone modem can be moved from PC to PC more easily than an internal modem.

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For the Authorized IBM PC Dealer nearest you-or for free literature on the IBM family of PC Modems-call 1800 IBM-2468, Ext. 141/EM. Or you can contact your IBM marketing representative.

### A HARDWARE HOOKUP FOR MULTIPOINT CONFERENCING

the Tori Interceptor differs in two immediately obvious ways from most other remote operations products: it is primarily a hardware approach to remote operations, and it allows communications among as many computers as you care to use, not just two.

Of the software products reviewed here, the Tori Interceptor is most directly competitive with In-Synch. Both are primarily concerned with transmitting keystrokes between computers. And with both, all users see the same thing on their screens because the computers are working in tandem, using the same applications program and files.

In the Interceptor's terminology, the active keyboard is the master. When establishing communications, the first person to hit the master button on his Interceptor is in charge. For another system to become the master, the current master must hit the master button to relinquish control. Then the person who hits his or her master button first becomes the next master

Note that each model of the Intercep-

tor is necessarily hardware specific. The model I tested will work only with systems that are hardware compatible with the PC and XT keyboard. (According to a Tori representative, the current version of that model will also work with the new enhanced XT keyboard.) This limitation rules out even the AT because of differences in the keyboard codes. As of this writing, a separate AT unit is in the final preproduction stage and should be available by the time you read this. The AT model will work with both the old and the new enhanced AT keyboards. There is also a model for the AT&T 6300.

The idea behind the Tori Interceptor is that a modern plugs in between the keyboard and computer. When you type, the modem intercepts keystrokes and transmits them through the phone line, and to your computer. The receiving modem decodes the keystrokes and forwards them to the computer on its end. From each computer's point of view, there is no difference between keystrokes typed at the local keyboard and keystrokes received through the modern.

FAST AND ACCURATE One of the most attractive features of the Tori Interceptor's design is speed. As with In-Synch, the 1,200-bps modern speed is quite acceptable. In the performance tests we ran, the Interceptor stayed fully coordinated on both sides, never dropping even a single keystroke.

The only problem I ran into when testing the Interceptor was with the phone system. Actually making the connections between two computer systems was no more difficult than with any other modem, but trying to set up a conference call to test the multipoint capability took some time and ingenuity. After solving problems with the phone network and establishing communications, the receiving systems worked the way they were supposed to, with each system duplicating everything I did on the transmitting system

Most of the Interceptor's capabilities and limitations grow out of the Bell 202 modem protocol it uses. This protocol differs from the more common Bell 212 protocol in several ways. The most important is that the Bell 202 protocol is half-duplex, meaning that only one side can send information at a time. The halfduplex protocol gives the Interceptor its multipoint capability by letting only one



The \$795 Tori Interceptor is a hardware approach to remote operations. It allows communications among many computers and acts as a modem intercepting keystrokes.

### FACT FILE

Tori Interceptor Tori Corp

12700 Nicollet Ave. South Minneapolis, MN 55337 (612) 894-5128

List Price: \$795 per node Reoutres: Identical communications so ware on both ends of transmission

In Short: A primarily hardware-based method of telecommunications that works as a modern between keyboard and PC. CIFICLE 600 ON FILADER SER

modern send information while all the other moderns listen. According to a Tori representative, there is no limitation on the number of nodes, but the system does get unwieldly if there are more than about a dozen computers on-line. The half-duplex protocol also limits the system to having only one keyboard active at a time, since only one modern can send in-

formation at a time. In addition to the Interceptor hardware, which is able to work by intelf for minimal communications, Fort provides a memory-resident software package catelled Feedback. With Feedback, the lost terceptor is able to list all neverols sites on sead or receive a scene image of file between the master site and any specified site, and transmit as receive image for the between the master site and any specified site, and transmit a reader in the file of the master site to all other sites. A new Keaturn has since been added that will let Feedback transfer a file from the master site to all the other controls sites similar to see the control of the control of the control of the site to all the other controls sites similar to see the control of the control of the control of the site to all the other controls site similar to see the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the site of the control of the control of the control of the control of the site of the control of the control of the control of the control of the site of the control of the control of the control of the control of the site of the control of the control of the control of the control of the site of the control of the control of the control of the control of the site of the control of the control of the control of the control of the site of the control of the control of the control of the control of the site of the control of the control of the control of the control

neously Although the Interceptor generally works as advertised. I have some reservations about it. First is the price: it will be hard to justify \$795 per node unless you are doing a lot of traveling that you could cut down on by teleconferencing or are paying for teleconferencing services that you can eliminate. More important, the only way I can imagine using the Interceptor efficiently is by keeping an active voice line parallel with the data line. And for multipoint situations, that means setting up two conference call lines, which may not be a trivial matter. But my reservation here is less about the Tori Interceptor than about multipoint teleconferencing in general. If you need the multipoint capability, the Tori Interceptor should do the job. And for point-to-point conferences or collaborative computing, the Interceptor's speed, combined with its reliability of transmission, makes it a highly useful tool .- M. David Stone

reviewed here. If you're interested in realtime computer collaborations, you should probably look to one of the faster programs. And if you're interested in setting to the computer of the your management of the computer of the computer your management of the computer of the computer words. The real strength of this program is words. The real strength of this program is new computer users—Close-Up is the programs of choice.

### Carbon Copy

Of all the programs reviewed here, Carbon Copy and Clost-Up are the two most directly competitive. With both, the hostside software is designed to talk only to a specific program and takes advantage of proprietary error-correction and data-cornpression schemes, both to speed up screen transfer and to provide security from unwanted callers or phone taps.

Like Close-Up, Carbon Copy can run as a memory-resident program, enabling a customer to load it, use an applications program, and call it up immediately if he or she runs into a problem. To use Carbon Copy as an unattended host, you have only to load the program and leave it set to answer the shone.

Since the two programs are so similar in function, a feature-by-feature comparison is almost meaningless—both have logs, password protection, phonebooks, screen capture, and so on. Yet they differ dramatically in feel.

Carbon Copy's strength lies in its speed. Although at any given bps speed Carbon Copy's screen update time is roughly the same as Closs-Up's, its single-line update is significantly faster. Instead of transferring the entire screen when only one line is scrolled, the way Closs-Up does, Carbon Copy sends only the new line and an order to scroll the rest of the screen up a line.

The numbers tell the story: At 2,400 bps, when scrolling WordStar a screen at a time, both programs take 7.5 seconds. When scrolling a line at a time, Close-Up still takes 7.5 seconds, Whereas Carbon Copy takes only 1 second. With 1-2-3 the numbers are different, but the relationship is much the same. In addition, at any





Version 3.0 Meridian Technology Inc. 1101 Dove St. Newport Beach, CA 92660 (714) 476-2224

List Price: 5195 Requires: 35K RAM, one disk drive, DOS 2.0 or later.

In Short: A few inconsistencies make the program too quirky as a support tool for inexperienced user, but the speed gives Carbow Copy an edge for cocompating or unattended host operations. Not copy protected (checks serial number).

CINCLE 600 OF READER SERVICE CARD.

speed, Carbon Copy makes the program far more usable at the remote location. And unlike Closs-Up, Carbon Copy really does cut response time in half when it goes from 2,400 bps to 4,800 bps. Carbon Copy did, however, introduce errors at 9,600 bps, making it nearly useless at this higher speed.

tronically, Closs-Up did better than Carbon Copy with graphics screens: Carbon Copy transferred the screen used in the performance test in 2 minutes and 33 seconds, whereas Closs-Up did it in 1 minute and and 45 seconds. But both of these speeds are too slow for real-time use, and in practice both programs are restricted to lext applications, except for an occasional realtime graphics screen.

Carbon Copy's weakness is that it is not as well thought out as Close-Up. For one thing, in Carbon Copy's terminology, the host computer is the "remote" side. whereas the remote computer is the "local" side. And if that's not confusing enough, instructions for both programs are intermingled in a single manual, which you will have to read to start Carbon Copy. When you load the program, it shows you a sign-on screen and returns you to DOS, just as with Close-Up, but it doesn't tell you what the hot key is (Alt-Right Shift). Once called up, the function key menu is simple and straightforward, but you need the hot key before you can get there.

Setting up Carbon Copy may be over-

whelming for a new computer user. While Close-Up makes a point of providing just two files-CUSTOMER and SUP-PORT-Carbon Copy has nine files, including an installation program that must be run before you can use the main program. And although each Carbon Copy package comes with both the host and remote programs on a single disk, these two programs will not talk to each other. When establishing the connection, Carbon Copy checks for serial numbers and won't initiate the link if the numbers match. This means you have to purchase two copies in order to use the program. Furthermore, the installation program includes some choices that apply only to one side or the other-vielding another possible source of

confusion for a new user.

Another minor problem cropped up when I connected two computers with a two control of two computers with a two control of two con

In actual use, Carbon Copy does somewhat better than Close-Up. 1 didn't run into any odd behavior with cursors, calling up SideKick, or anything else. And of course there is the speed advantage.

Carbon Copy is not an ideal support tool for inexperienced users. However, its good security features—password protection, proprietary data compression, and encryption schemes—combined with its relatively fast screen updates make it a good choice for unattended host operations when all the terminals are Post.

### Remote

With both Close-Up and Carbon Copy, the host-side software will talk only to specific remote-side software. Given an existing host-side program, there is nothing to prevent writing an appropriate remote-side program for any kind of computer so that, for example, an IBM PC host can talk to a



Remote, Version 1.3 Microstaf Inc. 1000 Holcomb Woods Pkwy. #440 Roswell, GA 30076 List Price: \$195 Require: 192K RAM

one disk drive, DOS 2.0 or later.

In Short: Remote is designed primarily for unattended host operations. It will talk to just about any terminal or computer you might want to try, including the 24K Tandy Model 100. Not copy protected.

GRICE WAS ONE ACOMS STRUCT CAPO.

remote Apple. But in practice, such a combination of host and remote software existonly for PC compatibles on both sides—at least for the software reviewed here. If you want to call your PC system from a client's CPM machine, you're out fluck.

The easiest way around this problem is to design the host-side software so it can talk to a large number of communications rograms, and terminals rather than just a remote-side program. You can then call more, from Micrountl, which is geared primarily toward using a system as an unstanded host, illustrates both the advantages and disadvantages of this approach. (To avoid confusion, firmly keep in mind that the computer numing Remote is actually the computer numing Remote is actually into the computer numing Remote is actually mine wore, other communications pro-

ning some other communications program is the remote terminal.) Remote comes with 23 terminal files. which are parameter files that tell Remote what terminal it is talking to and what screen control codes to send. Among the choices are Crosstalk XVI, the Tandy Model 100, the IBM 3101, and the DEC VT-100. There are few computers, if any, without programs to emulate at least one of the terminals. Unfortunately, Remote's ability to talk to nearly any computer is almost its only advantage over Close-Up and Carbon Copy. Remote was the first package to offer remote operations capability for the PC and has hardly changed since its introduction. Moreover, its first-generation feel, which was once clumsy but par-

donable, is now simply clumsy.

To begin with, Remore runs in the foreground only, which is fine for an unattended heat system but far less than ideal for support situations. If a customer runs into a problem, he has to leave the program, load Remote, establish communications, enter the applications program, and recreate the problem to demonstrate it. None of these tasks are made any easier by the presence of a chat window.

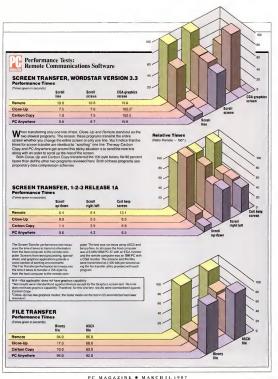
On the plus side, the program is self-documented. Anyone willing to browse though the menus should be able to get it working, marginally, without the manual. All the menu choices are guided by a series of easily understandable prompts along with menu lists to choose from

When you start Remore, it comes up with an uncrowded screen that contains the message: "Waiting for call..." and an instruction to press Else for the options mena. The options include two choices for mena, the options include swo choices for gram settings and one for Istiling, adding, and changing passwords. The program settings subment includes standard communications settings subment includes standard communications port, as well as settings for inactivity immout (1 to 255 minutes), the ring to the program of the program of

The password submenu deals with two kinds of passwords. The first is the master password, which you need to enter in order to add, change, delete, or list user names and passwords. The second is the individual password, whereby you enter as many user names as needed, along with a password and terminal type for each. When Remote answers the phone, it will ask for a password, then took the appropriate terminal that you usually use—your Tanyl Model 100, for example—you can designate that terminal file as standard to avoid having to load it with each call.

Once the program options and passwords are set, you can back up to the original sign-on screen, and the program is ready to run. When the phone rings, it will wait the designated number of rings, answer, and put the message "Caller logging in" on the screen.

The caller gets the request "Please enter your password." In my tests, the first



#### ■ REMOTE COMPUTING

entry was consistently rejected, but the second try was always accepted. Once logged on, Remote automatically loads the terminal file listed with the password that was entered and disappears, giving you the system promot.

At this point, you'll have to turn to the manual to learn how to generate the special keys from your remote terminal keyboard. One of the frustrations of the program is

Remote is the only program reviewed here that will work with the Tandy Model 100 as a terminal.

that it ignores the special keys on the remote terminal, even if you are using a PC. The function keys, cursor keys, PgUp and PgDn keys, and so forth, are typed at the remote terminal with escape codes. Cursor Up, for example, is Escape to Tescape A; Cursor Down is Escare Mor Escape B.

Another frustration is that you can't take advantage of color or graphics. If you run a word processor using color, the remote terminal will see it only in black and white; and graphics are completely impossible to transfer.

A third limitation of Remote is the speed of text screen transfers. Remote has two screen modes-one for well-behaved programs and one for programs that write directly to the screen. The screen-update speed in the second mode, which is the mode you need for most programs, is intolerably slow. With WordStar at 1,200 bps, Remote took 20.8 seconds to scroll either a screen or one line of text. With 1-2-3, the fastest scroll time was left or right at 10.2 seconds, far too slow to be usable. Worse, Remote does not use a realtime error-correcting protocol, and any garbage introduced in the transmission is entered in the spreadsheet.

At 2,400 bps, the scrolling times were cut in half, to 10.6 seconds for WordStar and 6.4 seconds for 1-2-3; both programs were still annovingly slow but usable.

Remote begins to be tolerable at 4,800 bps, with scroll times of 5.5 seconds for WordStar and 3.6 seconds for 1-2-3. At 9,600 bps, there were too many errors for the personer to be useful.

the program to be useful. In other tests, Remote would not work with SideKick because the Remote system does not recognize the Alt-Ctrl or Shift-Shift combinations when they are typed at the remote terminal. However, I was able to finesse Remote into working with DESQview. DESQview's hot key is Alt, but there is no way to send Alt from the remote terminal with Remote. By using the DESOview macro feature, however, I redefined Alt-D as Alt, then used the Remote escape code Escape-Minus-D to send Alt-D to the host system. But this means typing three keys where one should do, adding to the clumsiness of Remote.

If you are concerned only with setting up an unattended host or if your remote operations will be minimal, Remote may be a tolerable choice. Also, Remote has a built-in e-mail function for sending messages among system suers, and it is the only program reviewed here that will work with the Tandy Model 100 as a terminal. If the e-mail feature is important or you want to control your system from your Model 100, Remote is worth looking at.

### PC Anywhere

PC Anywhere, distributed by EKD Computer Sales and Supplies Corp., was written by Dynamic Microprocessor Associates. I expect a lot from DMA because the company is responsible for ASCOM IV, one of the best communications programs I've seen. Although PC Anywhere doesn't quite live up to expectations, it comes close, and in many ways it is the program Remote should have been

Like Remote, PC Anywhere is designed to talk to a wide range of terminals so that you can call the host from nearly any computer. Unlike Remote, PC Anywhere doesn't give up color or force you to ignore the special keys on a PC keyboard at the remote location.

Whereas Remote ignores color codes when sending screens, PC Anywhere converts them to the codes appropriate to the terminal you're using. It then sends the



color codes out the comm port with the rest of the screen information. The manual indicates you can speed up performance by running your programs in monochrome text mode; but even with the extra work it takes to handle color, PC Anywhere is much faster than Remote.

PC. Asymbere provides a menu list of 23 choices for terminals, including the DEC VT-100, the IBM 3101, and two user-definable options. Unlike Remore, it also includes a program-specific terminal program, ATERM, for use with an IBM PC or compatible at the remote location. If you choose ATERM as your terminal type and ran it at the remote location, you can seal your special keys at the remote key-board. If you thoose ATERM asyou terminal type and ran it at the remote location, you can sell your special keys at the remote key-board. If you though the properties are all your special keys at the remote key-board. When the properties are provided to the properties of the prop

In effect, PC Anywhere has a dual personality, it can this to just about any computer or terminal, and, when using ATEM, it offers real-time error correction, data compression, and other vintees of the computer of the comp



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#### ■ REMOTE COMPUTING

Like Close-Up and Carbon Copy, PC Anywhere can run in memory-resident mode, making it suitable for support applications. Until real-time error correction is available, however, I would stay away from this application.

Using PC Anywhere is simple: when you call up the program, you get a pointand-shoot menu with eight choices, each with its own pop-up submenu also using a point-and-shoot command structure. Or, if you prefer, you can skip the menu and give all the commands from the DOS command line.

For the most part, the menus are selfexplanatory. If you're familiar with communications, you should be able to get the program working without even looking at the manual. And if you're using ATERM at the remote location, you may never have to bother with the manual.

PC Anywhere's password protection is roughly equivalent to Remote's, except that there is no master password. You can set the program from on password, use a single password for all callers, or create a single password for all callers, or create as the of up to 16 passwords. Each password is an about a part of the command line associated with it. Although the manual fails to point this out, the initial command line is the easiest way to rest PC Anywhere for different terminal types.

One minor security measure notable for

One minor security measure nounce for its absence from PC Anywhere is the option of changing the ring number on which the program will answer. With Remote, you can set it as high as 255 rings, thereby discouraging random callers who search for modems with War Games-type dialing programs.

PC Anywhere's screen updates are much faster than Remote's. In fact, they are faster than those of Close-up and Carbon Copy as well. With WordStar at 1,200 bps, screen updates are about what you might expect using The Source at 1,200 bps: scrolling a screenful of text takes about 12 seconds.

With WordSur at 2,400 bps, PC Anywhere took 6.7 seconds to scroll one screen and 7. seconds to scroll up one line. With 1-2-3, scrolling left or right took 4.2, seconds, whereas scrolling up or down took just .6 seconds. At higher speeds, screen transfer rates gof faster (see the performance test results), but the number of

errors increased as well. More important, even at 2,400 bps, PC Anywhere is usable.

Version 2 will surely be slower because of the overhead for error correction, but the error-correcting feature can be toggled off. The extra speed gained by toggling it off may well be worth the occasional comnumications error if, for example, you have a high-quality line and are collaborating on a written report.

PC Anywhere had no problems with SideKick or ProKey. As with Remote, however, it would not transmit the Alt key by itself to call up DESQview. Here again, I sidestepped the problem by using the DESQview macro feature.

Weighing against all the good points of Parhywhere is one problem. My initial tests were run with the host program using an EGA—all without problems. However, when I ran my secondary tests on a CGA and standard color monitor, I had two choices for setting up the program, neither of which I found acceptable.

One choice was to install the program for "fast access to color graphics dapter," which created unacceptable snow on the host CGA even though the remote screen showed the information as expected. The other choice was to reject the fast access option, causing the host screen to flicker and the remote screen to lose information.

If you plan to use a Tandy Model 100 as a terminal, another significant drawback is the lack of support for the screen. Although you can define the screen control codes, PC Anywhere assumes that the terminal has an 80-character width and a 24-or 25-line length.

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M. David Stone is a contributing editor of PC Magazine.

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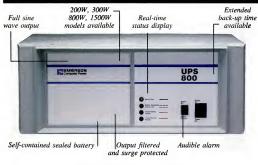
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## MAKING CONNECTIONS

### Invisible Network

LAN market becomes increasing complex, more and more manufacturers are positioning themselves in specific market niches. Some, like Novell and 3Com, are trying to be all things to all users. Others are looking for unexploited niches. Invisible Software carves out its niche through low hardware cost and compatibility with the 1BM/Sytek NETBIOS program interface. This way the company avoids duplicating the efforts of others while riding the crest of a new wave of system compatibility. Its product, the Invisible Network, is a LAN adapter card designed to use networking software made by other companies such as IBM.

INVISIBLE PRODUCT The Invisible Network consists of a full-length network System compatibility is the watchword for Invisible Software's Invisible Network.

But the NETBIOS

program interface is only the starting point: true flexibility when configuring the network and a price that is competitive with zero-slot LANs make the Invisible Network something to see.

■ FRANK J. DERFLER, JR.

adapter card, twisted-pair wiring with modular connectors, and a floppy disk containing the NETBIOS program. The user is expected to supply networking software that is compatible with NET-BIOS, such as IBM's PC Local Area Network Program. We tested the Invisible Network with PC LAN software running on three standard IBM PCs, on one IBM PC-XT, and on two 8-MHz IBM PC ATs, with one of the ATs acting as the server.

The cost for a starter puckage of two network adapter cards with the NETBIOS disk and a 30-foot cable is \$499.90. This price for two cards is less than what most companies charge for a single card. Relatively inexpensive software such as PC LAN, which retails for \$125, makes the Invisible Network an inexpensive option.

NETBIOS COMPATIBLE The Basic Input/Output System in DOS is software that handles certain input/output tasks and connects the main portion of the operating system with clements of the hardware. Part of the BIOS in the IBM PC is in ROM and part is in a hidden file. Each PC manufacturer must provide a version of BIOS unione to its hardware.

NETBIOS does a similar job for the network. It connects the hardware on the network adapter board with the main portion of the networking software. It can be in ROM on the network board or read into RAM from a floopy disk. Among its sev-

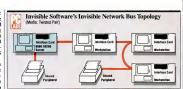
### The Invisible Network's price for two

cards is less than what most companies

charge for a single card.

eral functions, NETBIOS translates standard calls made by the networking applications software into actions performed by the hardware. NETBIOS is a James by the hardware. NETBIOS is a James some same time. One side of NETBIOS call some time, one side of NETBIOS call some time. One side of NETBIOS call some time, one side of NETBIOS call some time, one side of NETBIOS call some networking or applications programs. Innetworking or applications programs. Invisible Software provides NETBIOS call signed for its adapter cards in both ROM and RAM.

INSTALLING THE INVISIBLE The invisible Network adapter and is a highly visible circuit board carrying two modular plug connectors and a row of DIP switches. There are only three jumpers on the pulliproper of the property of the concluding of the DIP switches are used to program each board with a unique network duries, with a maximum of 45 addresses allowed. Almost every kind of network cards, but in many systems the address is often to the maximum of the control of the concerning of the control of the con



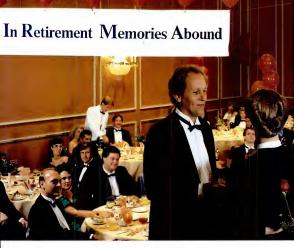
Invisible Network uses o bus topology with (1) twisted-pair wires running from station to stotion. Two pairs of wires are used in the cable between each station. Terminating resistors are available on each (2) Invisible Network interface card but ore activated only on the last card at each end of the network. It run under (3) IBM's PC Local Area Network Program software.



a registered Ethernet address allowing interface devices from different manufacturers to be used on a single network.

The numbering plan of the Invisible Network is unique in our experience because it requires that the highest-numbered card on the network be installed in the server or master station. The manual also states: "The network will operate faster if

you use consecutive addresses starting with 0." The only limiting factor in this numbering scheme occurs with the expansion of the network. Sometime during the installation of an Invisible Network system, a decision has to be made weighing network speed against expansion capability. For the speedies operation, the stations should be numbered sequentially with no



### **Retire Your PC Coax Connection**

The PC-to-host coax connection. She was a good piece of equipment working with coax cable and cluster controllers, but time just passed her by. End users started needing more than simple host access. They also needed their PCs to share resources around the

office. That's when local area networks came along to fill the need. LANs are dramatically increasing office productivity through efficient information management. And Gateways are exploiting LAN versatility by providing cost-effective host communication for PCs and other network devices. Now for thousands of dollars less, LANs and Gateways provide PC-to-PC and PC-to-host

communications all without a cluster controller.

INIS Gateway PC, Adapters are engineered around proven INS SNA 3274 chatter controller emulation. A single INS Gateway PC Adapter in an IBM NETBIOS compatible LAN, including Token Ring will support up to 32 logical unit sessions. The LAN allows each PC on the network to share disks, printers and other resources while the Gateway allows performance of any host-supported function and maintains host access.

INS planned on PCs becoming a major component in the development of information systems. We designed our Gateways to be the logical choice in providing the vital link between LANs and mainframes. We also planned on much more—flexibility, simplicity

and reliability. We provide free, responsive user assistance and guarantee every INS Gateway PC Adapter (hardware and software) for five years. Now the wast resources of mainframes and local area networks are available at your fingertips with INS Gateway PC Adapters.

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gaps. But if easy expansion is planned, then some gaps in the numbering scheme can be left for new stations.

Large or unexpected additions to the network are made easier by the fact that you can get at the address switches from the back of the card. This means that station address changes can be made without removing the cabinet of the PC or taking out the card. Whoever installs the Invisible Network should leave behind careful notes about how the network stations are addressed for those who might have to expand the network later.

The physical topology of the network is a bus with twisted-pair wiring going from PC to PC (see accompanying diagram). The lengths of wire eastly click in and out of the network adapter card like telephone line connections. The maximum cable length is 1,300 feet from end to end. The cable used for the Invisible Network must have two pairs of wire. It is reasonable to assume that properly installed telephone wire already in an office could be used to



connect the stations in the network.

Twisted-pair wiring can be made highly resistant to interference from nearby electrical and electronic devices. The Invisible Network adapter cards use special devices made by Texas Instruments, called line drivers, that control the signals on the ca-

■ The Invisible Network provides several operational alternatives that can increase its flexibility.

ble. Signaling is done in accordance with the new RS-485 standard, which was designed to provide robust connections over twisted-pair wires.

The network interface units located in the workstations at each physical end of the network must have two of the DIP winches set to activate resistors that electrically terminate the network. If stations are added to the middle of the physical network, no changes are needed. But if new stations are added to either end of the network, the terminating resistor must be deactivated on the often datation and activated on the new one. Like the switches used to set the sation address, the terminator to set the sation address, the terminator panel of the PC without the inconvenience of removing the cubited.

Electrically, the Invisible Network is a transmission bus. This means that all stations tap into the wire and share it by the use of special access protocols. In the case of the Invisible Network, there is more to the protocol scheme than meets the eye.

HEARTBEAT PROTOCOL The system designers at Invisible Software have come up with a new twist on the old CSMA (carrier sense multiple access) protocol. The basic CSMA protocol works by listening to the data bus and transmitting if the channel is clear. If two stations start to transmit at the same instant, collisions of their messages will occur. Various colliderie messages will occur. Various colliderie messages will occur.

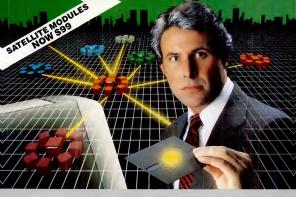
sion-avoidance and collision-detection schemes are used by different manufacturers. Some of them work after the fact by retransmitting lost messages. Others avoid collisions by various means. The folks at Invisible Software have applied for a patent on what they call the Heartbeat Collision Avoidance (HCA) system.

The HCA scheme uses the second pair of wires in the Invisible Network cable to send the network stations a repeating series of authorizations to begin transmission. The electronic "go" signal is sent to each numbered station on the network in a 25-millisecond burst. Every station gets a slot in the go cycle, so the greater the number of stations on the network, the longer the time between go signals for a specific station.

The HCA timing signal is independent of the data channel. When it gets a go code, the network station still has to listen to the channel to see if it is clear before transmitting. If the go code is present and the channel is clear, a message of variable length is transmitted. In many cases, the channel may not be clear when the go code is received because a station that received the go code earlier is still sending its message. The network station will not transmit into a busy channel but will listen for an opening all the time it is receiving the go code. When the go code drops, the station will stop looking for an opportunity to transmit.

Invisible Software claims this HCA system eliminates any opportunity for collisions on the network. The system allows stations to transmit the data they need to send, but it should prevent the hogging of the channel that can happen in more-traditional CSMA systems. A minor drawback of this scheme is the need for another pair of wires to connect the stations. More-significant drawbacks are that adding stations is more complex and that even stations not functioning on the network are given a time slot in the timing channel. This unused time slot is tiny, but it is still a missed opportunity to transmit that some other active station could have used.

INVISIBLE ALTERNATIVES The Invisible Network provides several operational alternatives that can increase its flexibility. Adapter cards marketed by several



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reminats, sul Without Dedicated Servers. Boasting a wide variety of configurations, LANLink\* is nost often set up as a "Star" having up to eight satellities connected to a cen-tral, nondeclaced server, Larger networks can have multi-ple servers, supporting a total of 73 or more network users. R-LAN\* (Remote-LAN) gives users the ability to interact with a LANLink\* network in real time via modern. Plus, if Multillink Actinged\*\* let no a Schelittle Intervenantie.

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#### ■ INVISIBLE NETWORK

different companies have the ability to instaff an optional ROM allowing the workstation to boot from the network and to read DOS from the server. This allows PCs without any disk drives to be used on the network. Companies such as Novell, which is now marketing diskless PC clones as network workstations, claim lower costs and improved security with diskless machines. If the workstation has no focal disk drive, a user cannot make a copy of a data or program fife and walk away with it. While this ability is an extracost option for other networks, it is provided as a standard switch-selectable mode of operation in the Invisible Network.

Programs in ROM network adapter cards will automatically steal RAM from the PC every time it is turned on. The Invisible Network adapter card takes 32K bytes of the PC's RAM for NETBIOS. However, another DIP switch allows you to disable the ROM and to load NETBIOS from a floppy disk. In this way, you dedicate RAM to NETBIOS only when you actually want to use the network. Loading the program from ROM is convenient, but if you use the network infrequently you probably don't want to lose 32K bytes of RAM every time you turn the machine on.

SOFTWARE FEATURES The networking program suggested for use with Invisible Network is PC Network Program from IBM, fBM has superseded PCNP with a program caffed PC Local Area Network Program, which is nearly identical but apparently has some additional features for the IBM Token-Ring Network. However, the Invisible Network adapter cards should work with any networking software that works through NETBIOS, such as Tapestry marketed by Torus Communications. Invisible Software selfs a \$99 program that modifies Novell's Advanced NetWare so that it can be used on the Invisible Network

If you use PC LAN, you will create a network in which every workstation is able to contribute devices such as disks and printers to be shared with other stations. You don't need a single dedicated server. but in most cases performance wiff be improved if you do.

A PC LAN command catted Net Share attows you to share whole disk drives or

### Benchmark Tests: Invisible Network

Natwork Speed

rivisible Network is low in cost but not in performance. The unique media-sharing scheme cannot give a blazing performance under light loads, but it maintained a generally good level of performance under heavy loads. The system requires advance planning to install, and it has limited expansion capabilities. Nonetheless, it provides the unique combination of IBM PC standard software, twisted-pair wiring that is easy to install, and, best of all, low cost in a single package

| Under Contention Interfece card Software Se |                       |                   | (Times given in seconds) |                |                 |        |               |
|---------------------------------------------|-----------------------|-------------------|--------------------------|----------------|-----------------|--------|---------------|
|                                             |                       | Server            | Zero                     | One<br>station | Two<br>stetions | Three  | Four stations |
| Invisible Hetwork                           | PC Local Area Network | B-MHz IBM PC AT   | 75.00                    | 93.00          | 127 00          | 159 00 | 233 00        |
| iBM Taken-Ring Network                      | PC Local Area Network | 6-MHz IBM PC AT   | 63.68                    | 71.54          | 63 47           | 97.41  | 110.73        |
| HetWere/S-Het                               | Advanced NetWare 68   | Novell Server 68B | 71.00                    | 63.70          | 94.29           | 103.71 | 115.68        |
| ARCnet                                      | Advanced NetWere:286  | 6-MHz IBM PC AT   | 59.45                    | 62 14          | 67.63           | 78.21  | 92.56         |

| Network plus<br>Server Cruncher |          |        | Perfo<br>(Times ) |
|---------------------------------|----------|--------|-------------------|
|                                 | Lifer    |        | Zero              |
| Interfere cord                  | Software | Server | station           |

75 00 109 00 129 00 167 00 237 00 Invisible Network PC Local Area Network R-MHz IRM PC AT ISM Token-Ring Network PC Local Area Network

8-MHz IBM PC AT 63 68 BB 00 130.05 171.46 216.11 NetWere/S-Net Advanced NatWare 68 Novell Server 688 71.00 73.05 79.45 66.87 91.00 **ARCnet** Advanced NatWare 286 B-MHz IBM PC AT 59 45 65 85 73.67 110.65 128.63 Performance Times

**Smart Applications** Zere One Two Three Four Interface card statione etation etatione statione eletione levisible Network PC Local Area Nativack 6-MHz IRM PC AT 60 00 110 00 143 00 160 00 175 00 IBM Token-Ring Network PC Local Area Network 6-MH2 IRM DC AT 64.00 68.00 71.00 65 00 NatWare S.Nat Advanced NetWere 68 Novell Server 688 61.00 61.00 62.00 63.00 64.00 ABCnet Advanced NetWare 286 6-MHz IBM PC AT 47.00 49.50 49.50 50.50 50.50

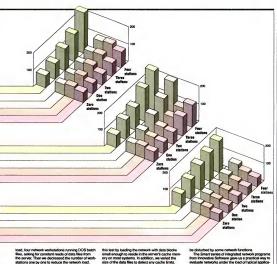
The benchmark-lest chart shows the results of tests run on invisible Software's invisible Network using IBM's PC Local Area Network Progrem working software. Shown for companson are our test results using the IBM Token-Ring Network hardware and IBM's PC Local Area Network Program. In both cases, PC LAN was configured according to parameters listed in the manual for a dedicated LAN server. The lest bed consisted of three standard IBM PCs, one IBM PC-XT, and two 8-MHz IBM PC ATs, with one of the ATs acting as the server. Deviations from this hardware configuration are listed below

For comparison we have included the results of the benchmark tests for Standard Microsystems Corp's ARCnet card with the same server running under Novell's Advanced NetWere/286 and for Novell's NetWare/S-Net card using a specialized

Motorola 68000 server. The same testing scena was used in all cases. Reviews of these two products appeared in "Making Connections: LANs Under NetWare," PC Magazine, Volume 5 Number 21. ARCnet was the Editor's Choice in that issue. ARCnet and NetWare S-Net servers were conf ured to operate only in the dedicated mode and not as dual-purpose server workstations. The networking software was installed using the default configurations.

erformance Times

For both the Network Speed Under Contantion and Network plus Server Cruncher benchmark tests, the depe endent variable is the time it took for the IBM PC-XT on a LAN to perform a standard set of DOS read-write commands against a single data file residing in the server. The independent variable is the network load. We began with the heaviest



files, asking for constant reads of data files from the server. Then we decreased the number of wor stations one by one to reduce the network load. The three-dimensional chart above shows the me it took the XT to perform the tests under the arrying network load on each network. For compa ion, we give the time it took to run the same tests

through the network with no other active stations (Zero stations). The difference between the Network Speed Un der Contention test and the Network plus Server

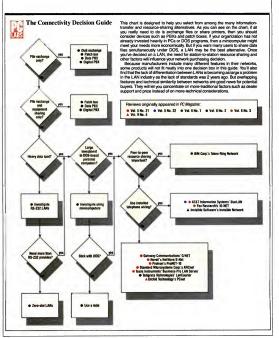
Cruncher test lay in the size of the data blocks that the workstations moved over the network. The Network Speed Under Contention test exer-cises the network when the network interface cards and the media are heavily loaded. We attempted to minate the factor of server disk access time from this test by loading the network with data blocks small enough to reside in the server's cache memory on most systems. In addition, we varied the size of the data files to detect any cache limits. The Network plus Server Cruscher test heavily loads the network interface cards, the moduland the server's disk drive access system. In this case we used data blocks of various sizes, some small some large, when we loaded the network in order to exercise the hard disk drive access system. The

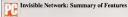
to exercise the hard disk drive access system. The results are influenced by hard disk performance and the efficiency of the networking software as it moves data on the disk and between the disk and the network interface cards. During both of these feets, we used a herdware clock residing on an AST SixPak card in the XT to determine the starting and ending times. We did not use the system clock because its operation can tions. In fact, viewed on a system monitoring screen, such as NetWare/S-Net's, the Smart Applications benchmark test looks and acts like a busy office, because the level of activity varies be in intense use of the network and quiet periods

tween intense use of the network and quiet periods when processing takes place.

For the dependent variable plotted on the three-dimensional chart, we used an IBM PC-XT operat-ing innovative Software's Ismart DBMS running a sorty! file that indexed and sorted shared database roots. The indexendent variable is an expense.

script me are insultance and so the area of the records. The independent variable was one through four workstations running another script from Innovative Software that created bursts of activity interspersed with periods of stence.





The features of a network system ere determined largely by the networking software. For all secreption of the method we used to evaluate each feature, see "Making Connections: LANs Under Netware," Or Megazine, Volume 5 Number 21. Because close attention must be past to its station numbering scheme, the invisible Network operating with IBMS 9 CLOSA Area Network Program was slightly more complete to Intella and sepand than come of the control of the Network Ne

message utility of IBMs PC LAN is good, the program doesn't have any buthin ability to send store-and-forward electronic mail. The security and troubleshooting features of the program do not compare well with those of other popular entervising programs. For comparison, the table includes Stendard Microsystems Corps ARCnet—an Editor's Choice—and high-scoring Novells Net-York Corps, and the Corp

| Product<br>Manufacturer<br>Software | Invisibile Network Invisible Software Inc. PC Local Area Network Program | IBM Token-Ring Network<br>IBM Corp.<br>PC Local Area Network<br>Program | NetWare S-Net<br>Novell Inc.<br>Advanced NetWare 68 | ARCnet<br>Standard Microsystems<br>Corp.<br>Advanced NetWare 286 |
|-------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------------------|
| NSTALLATION                         |                                                                          |                                                                         | 50                                                  |                                                                  |
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| fons drives                         |                                                                          |                                                                         |                                                     |                                                                  |
| ocumentation                        |                                                                          |                                                                         |                                                     |                                                                  |
| TETWORK<br>Administration           |                                                                          |                                                                         |                                                     |                                                                  |
| feors per month                     | 100                                                                      | 1.00                                                                    | 100                                                 | 1 25                                                             |
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| EATURES                             |                                                                          |                                                                         |                                                     |                                                                  |
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| COMPATIBILITY                       |                                                                          |                                                                         |                                                     |                                                                  |
| LAM-resident<br>offware             |                                                                          |                                                                         |                                                     |                                                                  |
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| BASE IN Plus                        |                                                                          |                                                                         |                                                     |                                                                  |
| Chase Series 5000                   |                                                                          | •                                                                       | •                                                   |                                                                  |
|                                     |                                                                          |                                                                         |                                                     |                                                                  |

specific directories on a disk with other network stations. You can even share a single file with the network by putting it into its own directory. You also use Net Share to indicate that a printer connected to a specific port on your workstation or server is available to the network.

The corollary command to Net Share is Net Use. This command links a disk drive

or device designator on a specific PC workstation with a disk drive or device being shared with the network. By typing

NETUSE D:\\SERVER1\DATABASE

the directory called DATABASE on the server named SERVER1 becomes your drive D:. The same kind of command line could link a device such as your LPT1 to

the LPTI on the server. You can also include a password in the Net Use command if the person who is sharing the resource specified that a password was needed in

the Net Share command.

Normally, commands such as Net
Share and Net Use are entered into batch
files by the network administrator. These
files can be called by an AUTOEXEC

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#### ■ INVISIBLE NETWORK

.BAT file when the system is started or be kept under a simple memorable title like Network. IBM also provides a series of menus that can be used to pass the commands to the network program.

IBM's PC Local Area Network Program has an excellent system for sending short messages in real time between stations on the network. These "rude" notes. are forced to the screen of the receiving station and can be used to coordinate the setup of shared devices.

PC LAN allows you to create print queues on machines sharing printers and to check a print queue to see the status of a printing job. There are no displays in PC LAN that give any status reports on the network load or activity. The Invisible Network NETBIOS program does include a NETPOLL program showing the active stations. Any other management or troubleshooting tools have to be added as thirdparty products.

PERFORMANCE The staff at Invisible Software was frank in stating that they did not recommend that the network be used in heavily loaded environments with over eight workstations. For heavier loads, our network of choice continues to be Standard Microsystems' ARCnet running under Novell's Advanced Netware/286, Howeyer, our benchmark tests show that the Invisible Network performs within accentable industry norms during tests that use five workstations and exercise the network far beyond the heaviest load expected in normal use. In short, even if you don't consider the price, it worked pretty well. If you consider that a six-node system comes in at about \$270 per node, including IBM's networking software, and that it has full NETBIOS compatibility, the Invisible

Network is a darn good deal. The Invisible Network gives strong competition to networks such as Fox Research's 10-NET in terms of performance | tor of PC Magazine.

and NETBIOS compatibility. However, the Invisible Network lacks the richness of features of 10-NET's networking software and other important factors, such as the training and customer support available with 10-NET.

The Invisible Network also drops into a price range that makes it competitive with the RS-232C-based zero-slot local area networks. It has much greater speed than these products. However, its signaling scheme cannot be easily converted for use over digital PBX telephone systems like RS-232C can.

The Invisible Network provides reasonable performance at a reasonable price. It's a good choice for an installation that will not grow beyond a few dozen workstations but can use all the power the combination of NETBIOS and PC LAN can provide.

Frank J. Derfler, Jr., is a contributing edi-

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### EDITING by COMMITTEE

Broderbund Software's new word processor/ note maker, ForComment, allows 16 reviewers to annotate and revise large writing projects.

ne part inspiration and countless parts editorial perspiration. What better way to describe the writing process? Anyone who's written more than a paragraph at a stretch knows that the going ests tough once the words get going editorial work is not the domain of a single ornicistent editorial—real perspiration of a gingle ornicistent editorial—real perspiration of the process of

Group participation is the norm for such large writing projects as reports, grants, proposals, legal briefs, novels, textbooks, screenplays, and so forth. Precisely how the tangled web of comments, revisions, Post-It Notes, boardroom meetings, Email brainstorming sessions, phone conversations, and the chicken scrawl of brackets, carets, and snaking arrows are transformed into a finished document is one of the unexplained mysteries of all time. ForComment, a new software package from Broderbund Software, is out to automate the group-editing process. It hails itself as "the missing link" in document preparation.

EDITING AS A GROUP ENCOUNTER Billed as a document reviewer, ForComment is a curious cross between a rudimenary word processor and an electronic note maker. Via a built-in import function, word-processed documents are made available "for comment." Members of a group can antotate and make revisions to a word-processed document. The ForComment display sized windows. Initially, the original document appears in the upper window and a blank lower window is available for editorial comment or revision.

In this fashion, the program allows multiple reviewers to create and attach notes to the original document in an organized manner. Each time a reviewer creates a note or revision in the lower window, it is automatically linked to a specific location in the text, stamped with the reviewer's initials, and dated. Reviewers can annotate text revise blocks of text and swap their revisions with the original document. Reviewers can comment on the comments of other reviewers. Authors can collate multiple review comments into a single document and make changes accordingly. ForComment preserves the original, thus maintaining an audit trail throughout the history of the document.

The program is available in both networked (\$995) and standalone (\$195) versions. Reviewers are empowered with two types of editorial input: comments, which are notes and annotations referencing a certain passage in a document, and revisions, which are rewrites of a certain passage of text. The comments and revisions of an many as 16 reviewers can be incorporated in a single document. In addition to comments and revisions, a notepad accommodates reviewer comments that aren't necessarily linked with a particular location in the text. The notepad may be kept closed as a private note taker or left open for access by all at the user's discretion.

A DATABASE IN DISGUISE Behind For Comment, unique power is database magic. A ForComment document treats magic. A ForComment document treats each line of text as fixed-length databases record. Notes and comments are essentially fields added to the record, linked by pointers to a single line. The ForComment file structure permits as many as 300 lines of comment for each line of text.

ForComment cleanly separates the re-

view process into author's and reviewer's tasks. The handsome, four-disk, standalone user package includes an Authors program disk, a Reviewers program disk. a Utility Disk, and a Demonstration/Tutorial disk. Authors as well as reviewers can comment on the document; the Authors program is identical to the Reviewers, but it contains additional supervisory functions. The software is not copy protected, and under a somewhat unique licensing agreement Broderbund specifies that while it is illegal to make copies (other than archival) of the Authors disk, you are free to copy and distribute Reviewers disks to all participants.

For Comment uses a well-executed hirearchical 1-23-like men bur, which occupies the top line of the screen. The command line is simple, but each command is powerful. Commands are invoked either by typing the first letter of the command or yusing the cursor keys to select. Function keys are used to facilitate certain common procedures.

The author (not necessarily the creator) is the originator of the ForComment review document. Authors' responsibilities include the preparation of the document for review at the onset of the process, as well as the collision and incorporation of the content of the collision and incorporation of the content of the collision and incorporation of the collision of the collision of the collision of the document. The convertible of the document. The convertible of the document.

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#### ■ GROUP EDITING

ten / Council Review Sang Lower window Find Motopad Al to make pointer to line for comment, then press DNIER.

Line 216 of 525 supports 5 popular networks. At this time there is no support for any sort of 4

electronic nail transmission.4

I was surprised to see my document more than double the amount of RMM memory it used 4 when it was saved as an .PC file. When you consider that the PC file is markly and

really a4 database file this makes perfect sense and while files do occupy a considerable4

Make sure to check with Broderbund and find out how much space a .FC file takes as compared to a u.p. file.

PAR 12-4-1985

P4 0 ... 1 . 1 ...

A comment is linked to a specific location in the document using ForComment's split window for electronic document review. ForComment can track the comments of as many as 16 users, leaving an electronic trail that any reviewer can follow.

sheet identifies the subject and date and creates a circulation list form on-screen. Circulation lists are created, stored, accessed, and modified as necessary. The circulation list uses a traditional

memo style: FROM: AUTHOR / TO: REVIEWER

An author enters the reviewers' names (which could be as nonymous as reviewer number 1, if desired), the reviewers' iniitals (to be used as their personal stamps during the edit process), and an optional password. During the edit process the cover sheet is updated to indicate each reviewer's access to both the comment and notepad facilities.

While the ForComment Authors program contains its own rudimentary text editor, called the MemoWriter, the author more typically imports a document from an outside word processing program. Limited as a document creator, the Memowhite is handy for creating quick directives and instructions. It is limited in size toitive and instructions, It is limited in size toiment of the control of the control of the search or cut and gaste capabilities. and offers no search or cut and gaste capabilities.

fortlessly but limitations may flaw the program for certain users. Currently ForComment works with text files saved in MultiMate, WordPerfect, and WordStar or ASCII format. If you work with any of the supported word processing formats you are in luck-ForComment leaves arduously created text formats intact. Other word processors sometimes have conversion routines to create WordStar or Multi-Mate files, and still others like PC Write can save an ASCII version of a file without losing formatting commands. Most other word processors are equipped to create ASCII files: however, all document formatting is lost during the ForComment session. When formatting is a vital part of the editorial process-as it often is with manuals, proposals, textbooks, contracts, and so forth-ASCII users are losers. Broderbund's initial choice of formats is an ambitious and well-thought-out start, but I'd hope future generations of this program will accommodate more and more document formats.

Once the prep work is complete the review document is saved as a special .FOR-COMMENT file and then distributed via disk, modem, or in a networked environ-

### PASSING NOTES

Some electronic notepad programs allow you to attach notes to files and make stacks of organized notes.

Word processing increasingly auto-mates the writing process, but the review process still occurs in a lonely nonautomated ivory tower. Electronic outliners help organize, spelling checkers correct as you type, thesauri offer instantaneous word alternatives, and style analysis/grammar programs offer limited stylistic and copy edit corrections. But face it, these electronic buddies don't have the same clout as a word of encouragement from a friend or colleague.

Most of us who write do so with great trepidation. Being locked into a personal word processor with no outlet to jot down a thought, comment, or suggestion is like playing a round of golf without a score card-you're bound to forget the score. ForComment is one vehicle for passing electronic notes and getting some feedback going on the writing process, but there are other avenues.

You remember invisible ink, don't you? Hidden comment lines in a word processed document are the electronic equivalent and are one way to pass notes. A hidden, or suppressed, comment feature lets you block a portion of text that will not be seen on the screen or in the printed document unless you want it displayed. During the review process, you can use these hidden comments to pass notes or to make personal notes on your document. If your co-workers use the same word processor, you are in luck. You can pass comments without upsetting your formatting.

ment. Currently ForComment supports five popular networks. At this time there is no support for any sort of electronic-mail transmission, though it would be a perfect vehicle for this sort of application

I was surprised to see my word-processed document grow to more than double the amount of disk space it used when I imported it and saved it as a .FORCOM-MENT file. This makes sense when you consider that the .FORCOMMENT file is ELECTRONIC NOTEPADS Deskton accessories such as SideKick offer primitive document-reviewing capabilities, SideKick offers blank notenads in which you can scribble a few lines of text or even write a short memo. The problem is that the notes are free-form and unorganized. They are not attached to a specific place in the document. Passing the note means passing a SideKick file along with the document.

In theory, Tornado Notes from Micro Logic lends a bit of organizational finesse to the note taking process. It allows you to stack your notes in layers and search for specific notes. One note can pertain to today's laundry pickup, another to a famous quote, and another to a great new conclusion for the proposal due tomorrow.

SmartNotes, billed as the electronic equivalent of Post-It Notes, lets you create a note and attach it to a specific place in your document. Notes are saved in their own files SmartNotes like For-Comment, can work as an editorial assistant in the document-review process, but it cannot work interactively to "swap"

your changes with the document. Back in grade school you could pass notes amongst your classmates, but you relied on your wiles to avoid getting caught. Electronic notes are a bittersweet reminder of those simpler days. You can pass them if you're careful, but depending on them as a means of editing is still a shaky proposition.-Robin Raskin

really a database file. While you should be aware that files occupy a considerable amount of disk space, memory has become plentiful enough that it shouldn't be a problem for most professional users.

A REVIEWER'S EYE VIEW Reviewers, after identifying themselves on the cover sheet, are permitted to make comments or revisions to the original document. Authors opt to handle the review in

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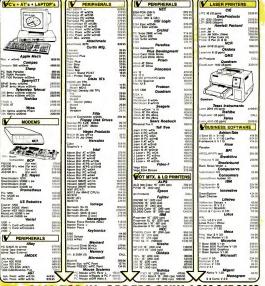
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#### GROUP EDITING

serial fashion, passing a copy of the Reviewers program to one reviewer at a time or in parallel fashion by distributing multiple copies of the program.

Reviewers work in a definable-size

lower window as the original document is displayed in the upper window. Each time the reviewer makes a comment or a revision it is associated with a line in the original text. A diamond-shaped symbol in the left margin of the original document signifies an associated comment. Scrolling through the document in the upper window neatly invokes all related comments in the lower window. Comments and revisions can be 4,000 characters (two to two and one-half pages) long, and a handy percentage gauge in the window's corner monitories.

tors the process. Invoking the revise command from the menu bar lets you mark a block of text. Immediately a copy of that block is displayed in your review window. In revision mode you may add or delete text only. Deletions offer a choice of editorial hatchet. You may mark a block for deletion, and it will appear as a strikeover when the document is printed (hence preserving a hardcopy audit trail). Or, you may actually delete text from the revised block (the original version is preserved intact on-disk). ForComment allows numerous revisions (maximum of 26) to the same line of text. When multiple revisions are entered, they are automatically assigned alphabetical identi-

Comments attach themselves as notes to a specific text location. Revisions can actually be substituted in the body of the original text. Select Swap and the original is stamped, dated, and swapped into the editorial window. The revision is inserted in the document. Swaps are easily undone, encouraging a healthy "my it on for size" attitude toward revisions.

In both the revision and commenting process, pressing F10 signifies "accep-



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tance" of the comment or revision. Upon acceptance the reviewer's initials and the date are stamped next to the note. On a color monitor the stamping is coded to match the reviewer's color identification in the circulation list.

Even a single user can benefit from ForComment. As an example, I used the program as a note taker to keep track of my questions and comments as I wrote this review. When I called Broderbund for answers I merely scrolled through the document and fired away my questions. While using the program to comment on the original document was fulfilling, I'm more reluctant to adopt ForComment to handle the revision process because it lacks much of a word processor's functionality.

The revision capabilities of ForComment are plausible, even helpful for simple rewrites. But, in reality, the revision process entails much more. Crucial to any edit process is reorganization, and in order to reorganize the document the ForComment author must trudge back to the word processor via a ForComment export route.

The best ForComment can do is to suggest a move, such as "Move paragraph 2 before paragraph 5" for execution after export. Execution requires word processing and ultimately an edit involves numerous trips in and out of ForComment. Given its inability to move text. I can revise faster and better on paper or within my word processor. Using these tools I change a word or phrase, move a few paragraphs, reorder a few sentences-the stuff editing is made of-in seconds. Editors will also feel limited by the amount of the document in view, a severe limitation when editing for a flow of ideas.

IDEA GENERATOR ForComment optimizes the flow of good ideas. One idea generator is Dialog. Using Dialog, a reviewer can comment on the comments of other reviewers. The comment you select to respond to appears in the upper window, while you enter text in the lower window. Dialog can go five levels deep. In a networked situation, Dialog can function as an electronic bulletin board. A Correction command allows reviewers to modify their own revisions. A simple Find command allows you to search for a string of text or for the next comment/revision.

PUTTING IT ALL TOGETHER The review process is incomplete unless revisions and suggestions are managed. Central to this process is the Collate command. Available only on the Authors disk, Col-

late incorporates all reviewer comments with the original .FORCOMMENT file. In a networked situation this is not necessary since multiple reviewers can comment on a single file, but in a standalone

### Dr. Dr. Zucker 'Cures'

### The Second Cure for Slot-Phobia

Sunnyvale, CA, February 1987



Pundits in our industry are continually pontificatine about how certain products can help you make more money and increase productivity. While some of these

claims are true, a lot are marketing jarson. I've taken my scalpel to some of this hot air and come up with a second cure for slot phobia - the fear of running out of slot space.

In last month's column, I introduced a first cure - two "Zuckerboard" half cards, each with all the functions of a full card. which snap together and take up just one slot. This slot phobia cure allows you to pack up to nine megs of extended memory in a single slot in easy-to-take dosages of one, two, four or eight megs

This week, I want to introduce a second cure - a half card primary board that can be configured with one or two serial ports and a parallel port. The primary b which works in either IBM ATs, XTs or compatibles, also has a video port that is activated when a secondary half card is snapped into the primary card.

The beauty of this discovery is that you get to put the video you want - not what a profit-starved manufacturer says you have to have - on a secondary board that snaps on the primary board. The secondary boa

can be traded-in to us at any time for credit toward higher resolution or color In short, with the second cure you get to choose the video you want - monochrome or color, text or graphics, high resolution or enhanced graphics. You don't have to pay now for a video adapter, for example, that has more input/output than you'll ever need. Our card lets you configure the card to what you need now, rather than be force-fed high priced functions you don't need. With our card, you buy just what you need now, then add features when you need them, and when they'll cost less

As you probably have surmised from my first two columns, my philosopny is based on making computing simple - and fun. You work hard for your money. I want to give you the honest deal you deserve. I do this with quality products that have only the functions you need. We then back them with strong service and a two year warranty. Basically, I'm trying to do in the board industry what Borland did in software - give you a brand name, quality product at a much lower price than the competition.

Speaking of having fun, our Zuckerboards are serious business (which our phenominal growth attests to), but not so serious that we don't enjoy what we're doing. Professionals often reach a fork in the road at middle age. Some go down the road to pomposity (pretty impressive, huh?), while others see the humor in life and enjoy laughing at themselves. Humor, if the secret be known, is my favorite cure, no only for slot phobia, but for a lot of other

Contact us or ask your dealer for more information

Note: Dr. Dr. Zucker (Matt Zuckerman, Ph. D.) is president of ATD, Inc. of Sunnyvale, CA, 235 Santa Ana Court. (408) 720-1938. CIRCLE 106 ON READER SERVICE CARD

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#### GROUP EDITING

system the author can merge all of the comments by simply specifying which files should be collated.

After collation, the author scrolls through the document and handles each comment or revision individually. The author can remove comments, swap revisions, and even comment on comments in preparation for editorial round number 2. The Select command lets an author hone in on specific revisions, organized either by date, type (revision or comment), or by reviewer. In order to facilitate the management of multiple review documents the Authors disk contains DOS utilities including DIRECTORY, FORMAT, COPY, RENAME, and ERASE.

If an author prefers to work with hard copy, ForComment supports a useful array of print capabilities. Comments and revisions can be printed either as footnotes or end notes. A print utility program defines the print characteristics of the revisions, and so, for example, you may underline revisions and use forward slashes to indicate deletions.

CUSTOMIZATION IS KEY ForComment provides an immediately customizable environment. Multiple customization files can be created, stored, recalled, and modified in moments. This becomes crucial when you find yourself blessed with an EGA and laser printer in the office each morning but are bleary eyed at your own monochrome monitor/Epson combo by night. The degree of customization is substantial. You can customize the keyboard so that ForComment's cursor movements mimic your word processor's.

You can specify date styles, backup preferences, and elaborate screen color schemes. You can set security levels for the review process. These high-, medium-, and low-security levels correspond to the types of actions a reviewer may take. If the author wants to preserve an audit trail, then the security is assigned as "high," prohibiting reviewers from swapping revisions.

Broderbund's commitment to evolving technology is evident. ForComment can be used on LANs and automatically adjusts for DOS 3.1 and the Lotus/Intel/Microsoft expanded memory. A 43-line EGA display command is available.

The ForComment reference materials were actually developed using the program on coasts. The result is a testimonial for the program. The manual includes both a stephysep, however found in a destination of the program. The manual includes both a stephysep, however founding and a commendated reference guide. An Appendix provides a mini-manual to handle ASCII conversions for more than 20 major word processors. Incidentally, ForComment can also handle ASCII import for spread-steet, databases, and other files.

As good as the documentation is, you won't need it very often. The menu cours mands are intuitively organized and the submenus are carefully crafted to limit errors. The F1key invokes in-depth, context-sensitive help. Each help screen offers a menu bar providing Jump (to another help) and lack (for a help overview) options. The manual and help screens closely resemble Microeff (Worfs 1) was the province of the

resemble Microsoft Word's layout.

According to Broderbund, ForComment is intended to be used in "networks
or standalone, across common work
groups or within departments of large
companies." Broderbund cites in-house
publications, corporate communications,
marketing, training, and personnel departments as perfect settings and sees potential
users in academic, governmental, law,
computer, and insurance firms.

The program is a useful tool in both the creation and the revision of a document. I find the program more useful as an electronic note taker and brainstormer than as an editor. After giving it a few real-life test runs, I sense an initial resistance to automating the review process. Believers in blue-pencil magic find intangible benefits in white margins on a printout.

But ForComment should not be disnised as a firsbully, In the right cervionments, the program is ideal. An author in search of managable feedback will love it. Those who must maintain historical records of a document in progress will find ForComment to be the perfect solution. Despite some shortcomings, ForComment is a boon to the group-writing endeavor and can make the group experience much more productive.

Robin Raskin is a frequent contributor to PC Magazine

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plays - features or options that are not available on some EGA boards. Since all your current software will

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# PRODUCTIVITY

■ PC LAB NOTES: DOS ENVIRONMENT ■ RICHARD HALE SHAW

## A USER'S GUIDE TO THE DOS ENVIRONMENT

In this first of a two-part series, you'll learn even more than the Sierra Club knows about the fundamentals of managing the environment.

Pew PC users take advantage of the power the DOS environment prosides. Indeed, to judge from the 
sant number of applications that utilize 
the environment, even professional programmens seem largely to ignore it. Yet, 
by using the environment, you can create 
global variables that are accessible, without command-line parameter passing, by 
JAT file or program. You can emgram options quickly, on the fly, without 
butch-file or command-line editing. You 
can even use the environment to eliminate 
programs of the programs of the 
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Why, then, has this part of DOS been on neglected? There are several reasons. For the applications programmer, it is inconvenient to have to perform more than a simple DOS call to access the environment. Moreover, unlike batch files, programs don't get access to the environment ere's perspective, however, the chef impediments have been that there is very little documentation available on the environment and that its limited space is not very useful unless you know how to expand it.

In the two parts of this tutorial, I'll focus primarily on batch file utilization of the environment and on how to increase its size. If you'r new to the environment, this is where you'll get the most immediate benefits. I will, however, also get into some of the issues involved in writing programs that access the environment, thus trying to cover the information every DOS power user needs to know to utilize the environment.

WHAT IS THE ENVIRONMENT? Doe not support is a memory pool of systemwide information that is available to any batch file or program. You can think of it as a special kind of memory storage area set aside by DSA. Virtually any kind of information can be placed in the environment. The Microsoft C compiler, for example, uses the environment to pass file-handling information from one program to another.

The actual memory area where the environment information is stored is called the Master Environment Block. Each item

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To copy over existing files or not to copy: COPYSAFE lets you decide. SPREADSHEET CLINIC Limit data entry, protect updated files.

and other spreadsheet tips.
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PC TUTOR
Working with clusters to get the most

out of your hard disk.

st SE

there is stored as a series of characters called a *string*. Environment strings consist of a variable name, an equals sign, and a word or phrase of data, in the form

variable=phrase

where variable is the name of an environment variable and phrase is the information stored with that variable.

The environment strings consist of the more familiar PROMPT and PATH descriptor strings and the lesser-known COMSPEC variable. While DOS creates COMSPEC and PATH by default, you can manipulate all three directly from the DOS command line or from a batch file by using the SET. PATH. or PROMPT commands.

In addition, DOS lets you create "userdefined" environment variables in which to store your own information with variable names of your own choosing. You can create, delete, and modify these varianess with SET. User-defined variables mith SET. User-defined variables employed in conjunction with batch files can be one of the most versatile aspects of DOS. To get an immediate idea of how to use the environment with batch files see the sidebar "Past Track to Environment Usage: HOME: BART."

THE SET COMMAND The most convenient way to modify the environment is via the SET command. You can use SET at the DOS prompt or in a batch file. The full syntax for using SET on the DOS command line is

SET [variable=[phrase]]
where variable is the name of the environ-

#### ■ PC LAB NOTES

ment variable you want to modify and phrase is the string of characters you want the variable to refer to.

If you enter SET by itself (making no entry for either variable or phrase), DOS will display the current environment strings on the screen. This can be captured in a file by using redirection. For example,

SET > ENVFILE.TXT

will write a copy of the current environment strings to a file called ENV-FILE.TXT (which can then be searched with FIND).

If you omit the phrase (using just SET variable=), DOS will remove the variable from the environment.

from the environment.
When you sue SET to define an environment writable, you should note that any more than the second of the variable name it and the second of the variable name it seeds, so SET x = y will create a variable called "x - Similarly, spaces after the equals sign become part of the phrase; SET x = y will set the variable x to the primace "y = DOS always capitalizes the variable name passed to it by SET, regard-order to the primace properties of the primary second of the primary

The vivious ment strings entered on the command line or in a batch file are limited to 127 characters in length by the DOS command-line processor. Indeed, most environment strings are limited to 123 characters because "552" r lakes up four characters because "552" r lakes up four and PROMPT don't require the use of 55T, they alone can use the full 127 characters. An environment variable name or phrase can be any length as long as the entire string's combined length (including principles) and the string strin

To illustrate the use of SET, enter

SET PASSWORD-SHERLOCK

This creates an environment variable called PASSWORD that refers to the phrase SHERLOCK. You can change the phrase that PASSWORD points to at any time by entering the change with SET:

SET PASSWORD-WATSON

changes PASSWORD to refer to WAT-SON, and

SET PASSWORD-

removes PASSWORD from the environment altogether. (Be sure not to leave any spaces after the equals sign when deleting an environment variable; if you do, the variable will remain in the environment, as the string to be deleted will not match the original.) To make sure you have removed

■ PROMPT is not an independent DOS command; it's shorthand for SET PROMPT. You can use either when customizing the PROMPT variable.

an environment string, just enter SET by itself, which will produce a display such as

COMSPEC=D:\COMMAND.COM
PATH=B:\;D:\;C:\;C:\BIN
HOMEDIR=c:\ds\br\nextbr
PROMPT=SpS\_

THE PROMPT VARIABLE Learning how to modify the ublquitus A-5 (C= for hard disk users) DOS prompt is one of the first tricks a budding power user learns. PROMPT is not an independent DOS command; it's actually shorthand for SET PROMPT. You can use either PROMPT or SET PROMPT when customizing the PROMPT when customizing the PROMPT when for SET PROMPT when customizing the PROMPT warfable.

Different prompts can be created by the use of what IBM calls meta-strings, which are composed of symbols from a built-in table that DOS interprets. Meta-strings all begin with an initial dollar sign (5), which is immediately followed by the meta-string symbol or character. For example, the default prompt itself is simply the meta-string Srofg. The Sn displays your current drive letter, and the Sg displays the greater-than (>) sign.

You can observe this yourself by entering the following commands at the DOS prompt (the "SET" and "=" are optional and can be omitted in each example):

SET PROMPT= SET PROMPT=\$n\$g

The first example above removes any exsting PROMPT variable from the environment. The second command will restore the DOS default prompt. DOS provides a variety of meta-strings that can be used singly or in combination to configure your prompt. (The full table is listed under the PROMPT command entry in your DOS manual, so it is not repeated here.)

DOS will ignore a "mull" meta-string, which is created when you follow then string character that is the string character? Swith a character that is not a meta-string symbol. But DOS will print, as part of the prompt itself, any characters that immediately follow and null meta-string. This gives you an opportunity to include almost anything in the prompt. To print a name or a phrase as part of a prompt, you simply precede in with a null meta-string like "Ss." For instance, the PROMPT commonly.

SaGood Morning:

will produce the prompt

Good Morning:

For more illustrations of how you can manipulate your prompt, see the sidebar, "A Prompt-Switching Batch File."

THE COMSPEC VARIABLE COM-SPEC, an acronym for COMMAND SPECIFICATION, defines the drive, path, filename, and extension of the DOS command interpreter.

When DOS initially boots your system, different parts of COMMAND. COM are loaded into high and low memory. The optotion in high memory controls the use of batch files and internal commands—capabilities that are not needed while a program is being run. Programs that need the additional memory space can overwrite (and thus use) the high-memory part of COM-matery to the high-memory part of COM-matery and the command interpreter has been overwritten by the program. If so, it releads that part from the disk.

Enter the COMSPEC environment

#### FAST TRACK TO ENVIRONMENT USAGE: HOME.BAT

HOME

Hard disk users usually create (at least temporarily) a subdirectory for each new project they begin. Often these end up being several subdirectory levels deep. If you have to change to other directories from time to time. however, getting back to your nested project subdirectory then means typing (and often mistyping) a long path name over and over again.

By SETting a single environment variable and using a two-line batch file called HOME.BAT, you can get immediately to your project subdirectory by simply entering

HOME

To construct HOME.BAT:

 Using a text editor or EDLIN, create the file HOME.BAT, being sure to press Enter at the end of each line.

echo off if not /%HOMEDIR%==/ cd %HOMEDIR%

(If you use COPY CON to create HOME BAT, don't forget the final F6 (or Ctrl-Z) and <Enter> to close the file.)

2. Put HOME.BAT in any of the directories listed on your PATH. [If you have a lengthy PATH variable in your AUTOEXEC.BAT, you may want to put HOME.BAT in the root directory, as it will execute perceptibly faster—Ed.]

 Assuming your project directory is C:\LOTUS\PAYROLL\PROJECT, at

variable. It tells DOS from where to reload the command interpreter. The DOS default for this variable is

COMSPEC=C:\COMMAND.COM

on a system booted from a hard disk, and

COMSPEC=A:\COMMAND.COM

on any system which was initially booted from a floppy disk, regardless of whether or not a hard disk is attached. This means that the drive and path to the command interpreter can then point to any valid copy of COMMAND.COM (or any other command interpreter).

the DOS command prompt enter

COSET HOMEDIR-C:\LOTUS\PAYROLL\PROJECT

Now, whenever you've been working in another directory and want to get back to your project, just enter

DOS will automatically switch to the directory name pointed to by the environment variable "HOMEDIR."

HERE'S HOW IT WORKS The operation of HOME.BAT revolves around the environment variable HOMEDIR. The percent (%) signs on either side of HOMEDIR identify it to DOS as an environment variable in a batch file. Without then, DOS would literally try to use the word HOMEDIR as the name of a COM, EXE, or BAT file, and you dy predictably end up with an error mestage.

When DOS recognizes the use of an environment variable in a batch expression, it tries to find that variable in the environment. If it is found, DOS substitutes the phrase it points to for the variable itself and rereads that line of the batch file. In HOME.BAT, DOS has to make this substitution whice on the second line.

The IF expression acts as a precaution in case the HOMEDIR variable has not been defined in the environment. If that's the case, the IF expression would be rein-

To change the COMSPEC with SET, you enter

SET COMSPEC=[d:][path]filename.ext

where d: is the drive, path is the directory path, and filename.ext is the name of the command interpreter to be used.

Reloading the command interpreter after a program terminates may tie up your system an extra 1-4 seconds before the DOS prompt appears. This is a good reason to change COMSPEC. If you are using a RAMdisk under DOS 3.0 or later (for example, as drive D.), you can pare down terpreted as

if not /==/

which reads "if not an empty string expression." Since the string will be empty if HOMEDIR is not defined, the expression will be FALSE and the CD (changed directory) command will not be executed. (The forward slashes allow you to test for an empty string expression in a batch file; "%homediffs"=="" could also have been useful instead.)

If HOMEDIR has been defined, the expression is TRUE and the CD command will execute. (If the CD command did execute without a directory name, no harm would be done, but this is a safe way of handling potentially more powerful commands—a good habit to form.)

In the example given above, DOS will reinterpret the second line of HOME BAT as

if not /C:\LOTUS\PAYROLL\PROJECT==/ od

and since HOMEDIR is defined, CD changes to the C:\LOTUS\PAY-ROLL\PROJECT subdirectory.

An additional convenience in using an

environment variable in HOME.BAT is that HOMEDIR can be redefined on the fly. Any time you want to return repeatedly to a different subdirectory on your hard disk, just change the definition of HOMEDIR with the SET command.—Richard Hale Shaw

this time by putting the following two lines in your AUTOEXEC.BAT file:

COPY COMMAND.COM D:\
SET COMSPEC=D:\COMMAND.COM

(substitute the drive letter of your RAMdisk in place of D:).

Applications programs that let you load Downbox getting out of the program itself use COMSPEC to load COMMAND .COM. If you use that capability, or you load COMMAND.COM in your batch filles, you can speed up the loading process with this technique.

#### ■ PC LAB NOTES

If you do change the COMSPEC variable, remember that this is the only way DOS will know where the command processor is located. Take extra care to make sure a copy of COMMAND.COM is in the directory and on the drive pointed to by the new COMSPEC setting. Otherwise, you may get the much-to-be-dreaded "Cannot load COMMAND, system halted" message from DOS.

THE PATH VARIABLE The PATH variable comprises a list of directories that DOS searches to find programs or batch files. Although it can be used on floppy disk systems, PATH is most effective with a hard disk, combined with a well-orga-

nized directory structure. PATH lets you organize your disk. With it, you can place your most-used (or beloved) programs and utilities in unobtrusive, out-of-the-way subdirectories, and

PATH will find them for you. To change the PATH variable, enter

SET PATH=[d:]directory[;directory]

where d: is an optional drive specification As with the PROMPT command, the SET and the equals sign need not be entered, saving extra characters should you require a very long path specification.

HOW PATH WORKS Whenever you enter a command-whether from the DOS command line or from inside a batch file-DOS begins by checking your entry against its internal command list. (Internal commands include DIR, COPY, TYPE, etc.)

If the command is not an internal command. DOS assumes that it is an external command (a program or a batch file). It searches the current directory for the external command, trying first with a file extension of .COM, then with .EXE and .BAT. In each case, if the filename is found with one of the three extensions, then it is loaded and executed.

If the external command has not been found in the current directory with any of the three filename-extension combinations, then DOS looks for a PATH variable in the environment. If a PATH variable has not been defined, the search ends there and DOS prints its "Bad command or file

#### A PROMPT-SWITCHING BATCH FILE

To illustrate the use and selection of a variety of prompts, I've created SWPROMPT.BAT. It lets you switch between five different DOS prompts at will. To initialize the various prompts, I've also written STPROMPT BAT. When run, STPROMPT will create envi-

ronment variables representing: 1. a dollar-sign prompt,

- 2. a date-and-time prompt, 3. a prompt that displays the current
- directory. 4. a "Welcome to IBM Personal
- Computer DOS ver. 3.2" prompt, and 5, a prompt created from my initials enclosed in "<>"
- After running STPROMPT (which you need do only once in a DOS session), you can at any time enter

SWPROMPT n

where n is a number from 0 to 6. If you enter a number from 1 to 5. SWPROMPT will change your prompt to one of the five described above. If you do not enter a number, no change will take place. Entering a 0 reverts to the standard DOS A> prompt, and entering a 6 will reset the prompt to what it was

when you first ran STPROMPT.

Naturally, you can modify STPROMPT.BAT to initialize your own series of custom prompts. If you change the number of prompts being initialized, simply modify SWPROMPT to handle the right number.

STPROMPT.BAT makes use of the meta-strings explained in the main body of this article, and consists of the lines

ECHO OFF

IF /APROMPTS==/ SET PROMPTS=%PROMPTS

SET PROMPTI=68

SET PROMPTI=68

SET PROMPTI=68

SET PROMPTI=69

SET PROMPTS=61

SET PROMPTS=1 RESS

SET PROMPTS=1 RESS

SWPROMPT. BAT is as follows:

ECHO OFF

IF /E1==/ GOTO EXIT IF %1==Ø PROMPT=

IF %1==1 PROMPT=%PROMPT1% IF %1==2 PROMPT=%PROMPT2% IF %1==3 PROMPT=%PROMPT3%

IF %1==4 PROMPT=%PROMPT4% IF %1==5 PROMPT=%PROMPT5% IF %1==6 PROMPT=%PROMPT6% :EXIT

-Richard Hale Shaw

name" message. But if a PATH variable has been defined, DOS will look for the three combinations in each of the directories listed by PATH.

The sequence is important to understand. If you had two programs with the same name but different extensions (e.g., PROG.COM and PROG.EXE) in the same directory on the PATH, PROG.EXE would never get run, since PROG.COM would be found and executed first. The same would be true in the combinations: PROG.EXE and PROG.BAT, or PROG COM and PROG.BAT. The search order of the combinations is always the same (.COM, .EXE, and .BAT). However, if PROG.EXE were placed in a directory that appeared earlier on the PATH list than PROG.COM, only PROG.EXE would

ever be executed. As a final note on this point, some users mistakenly place , or . \ in their PATH list.

These symbols represent the current directory. But since the current directory is searched before the PATH is even examined by DOS, their repetition serves only to slow down the search process. The dot and dot-backslash entries could be useful only if a specific drive was referenced ("C:.") and work was being performed on

USING THE PATH When DOS first creates the environment, the PATH is initialized to a null string or empty string of characters, such as you would get if you cancelled your current path setting by entering

PATH=

another.

Your ALTOEXEC BAT file should contain an appropriate PATH statement as one of its first lines. Then programs subsequently loaded can be found on the PATH.

#### A PATH-SWITCHING BATCH FILE

SWPATH.BAT provides an example of how you can change your PATH from within a batch file. SWPATH lets you switch between four different PATHs at will. To use it, just enter

SWPATH n

where is a number from 1 to 4.

SWPATH requires that four environment variabites, PATHI, PATHI2,
PATHI3, and PATHI4, be intiliated. This is accomplished by running SETPATHI And PATHI4, be intiliated. This is accomplished by running SETPATHI ARTO note before first using SWPATH (you only need to run SETPATH once per DOS assission). Make
PATH deep the CATHI, PATHI2, and
PATHI3 define meaningful paths are
on your current subdirectory structure.
The subdirectory structure.

The subdirectory structure.

work unless you have the same ones.

If you enter a number from I to 3 following SWPATH on the command line. your path will be reset to a path pointed to by PATHI, PATHZ, or PATH3. If you enter a 4, your path will be reset to its original state at bootup—the way it was before you ran SWPATH. SETPATH.BAT (used as an exam-

ple) might consist of the lines

ECHO OFF
PATH1=C:\WP\LTRS

PATH2=C:\LOTUS\PAYROLL PATH3=C:\;C:\UTIL;C:\WP PATH4=%PATH%

SWPATH.BAT is as follows:

ECHO OFF IF /%1==/ GOTO EXIT

IF %1==1 PATH=%PATH1% IF %1==2 PATH=%PATH2% IF %1==3 PATH=%PATH3%

IF %1==5 PATH=%PATH5% IF %1==4 PATH=%PATH4% :EXIT

-Richard Hale Shaw

Which directories should be included in 1 your PATH variable will depend on the organization of your hard disk. My general recommendation is that you should not have any files in your root directory other than COMMAND.COM. AUTOEXEC .BAT, CONFIG.SYS, and the two DOS hidden files, IBMBIO.COM and IBM-DOS.COM (which do not show up in standard directory searches from DIR). You should probably place your utilities and "most-used" programs in one large subdirectory. This can be named UTILITY or UTIL for the currently fashionable BIN-Ed.]. Using this kind of directory scheme, the PATH can be as short as

PATH=C:\;C:\UTIL

You might add directories dedicated to any special programs.

This will make all of the .COM, .EXE, and .BAT files placed in UTIL available for use from any directory of your hard disk. DOS will find these programs for you, as if they were in your current working directory. An alternative procedure for keeping your PATH search length reasonably short is to incomporate a way to switch

the actual PATH in use without rebooting. Details on implementing this facility are given in the sidebar "A Path-Switching Batch File."

A PATH LIMITATION Application programs like Workfar often use control programs like Workfar often use control programs files, which usually have OVR of COVL file extensions. DOS will not find files with these extensions on the PATH unless the applications program explicitly unless the applications program explicitly doesn't, but some off the new roses, such as Microsoft World, do.). Several good "PATH enhancement" programs to work and the control programs to work and the control programs to work and the control programs to work with the control programs to work with the control programs to work with the control programs to work the control programs to work the programs to the programs

USING BATCH FILES While most of the discussion thus far in this column has been primarily in terms of command-line entries, batch files can also directly access and modify the environment via the SET, PROMPT, or PATH commands. In order to be read in a batch file, environment variables must be surrounded by percent signs

(%), although they can't be read this way from the DOS command line.

By making use of the FOR statement, a batch file can print out parts of environment variables that have been delimited by

semicolons. Thus,

POR SST IN (SPATHS) ECHO SST

will produce a list of directories in the PATH. If the PATH variable were

PATH=B:\;D:\;C:\;C:\BIN

the FOR statement above would display

B:\ D:\ C:\

C:\BIN

While PATH is used as an example here, any environment string whose parts are separated by semicolons can be broken up this way.

One great advantage of using environment variables in batch files is that they can be redefined on the fly. For instance, an environment variable named PASS-WORD might have been defined as ANY-ONF with

SET PASSWORD-ANYONE

in AUTOEXEC.BAT. If a batch file that loads an Accounting package has the lines ECHO OFF

IF %PASSWORD%==ROSEBUD GOTO START ECBO INVALID PASSWORD!! GOTO EXIT ISTART IRUN ACCOUNTING PROGRAM

then only users who entered

ACCT

:EXIT

SET PASSWORD=ROSEBUD

prior to running the batch file would be able to get into the Accounting system. This level of security check won't stop

power users, but it will stop novices cold.

If you modify the environment from the
DOS command line or from a batch file,
the changes you make will be available for
all programs subsequently run. The exception is with batch files that run under a sec-

ondary copy of COMMAND.COM.

It's a common practice in batch file programming to load a second copy of COM-



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#### PC LAB NOTES

MAND.COM to run a second batch file. The reason is that DOS does not allow batch file nesting—that is, betch files do not return when called from one another. Suppose, for example, that you wanted A.BAT to run B.BAT and return to A.BAT. To do this, part of A.BAT would consist of the line

COMMAND.COM /c B.BAT

This is fine in ordinary practice. But when you load B. BAT with an additional copy of COMMAND.COM, DOS gives it a copy of the environment, and changes made to that copy are lost when the .BAT

 DOS does not allow batch file nesting—that is, batch files do not return when called from one

file terminates. You might easily have thought that a line in B.BAT such as

SET SIGNAL=OK

another.

would allow B.B.AT to pass environment information back to A.B.AT by putting the environment variable "SIGNAL." in the Master Environment Block. Unfortunately, "SIGNAL." would only be SET in B.B.AT's copy of the environment, Any modifications that B.B.AT makes to the environment copy will be lost on returning to A.B.AT. Since it runs under a secondary to the A.B.AT. Since it runs under a secondary to Command Processor, B.B.AT can't add the variable SIGNAL to the Master Environment Block.

In the concluding part of this article, next issue, I'll discuss the access that applications programs have to the environment, how you can increase its rather stingy default size, and how your own program routines can search and read it.

Richard Hale Shaw is a microcomputer consultant and software engineer who works in Louisville, Kentucky,



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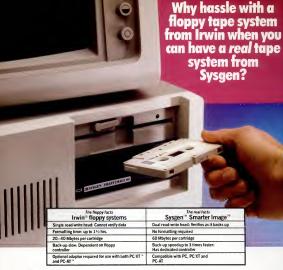
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the lape. Errors go undetected, so users won't know if they've recorded accurately until it's too late. With Smarter Image, you know you have accurate backup data because reliability is built-in. The system features two read/write heads: one records data while the other

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and faster back-up speeds for far less waiting.

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# PREVENTING COPY DISASTERS



DOS gives you no warning when you're about to COPY onto a same-named file, but with COPYSAFE you can choose to go ahead or to step back and avoid an irretrievable mistake.

There probably isn't a reader of this column who hasn't at least once experienced the agony and the angst that come from realizing that you just inadvertently wiped out a document by copying over it. All you did was enter

when what you meant was

#### COPY \*.\* \WS\ARCHIVE

But as a result, you overwrote all your new files with the outdated files of the same name—just the opposite of your intent. Not even Norton's utilities will help. Your data is permanently gone, physically replaced on the disk.

The trouble with computers is that they do what you say even when that' not what you mean. Until we get a MINDREAD COM, however, I've got the next best high. COPYSATE is a resident program that monitors the DOS prompt and, if you enter COPY, looks ahead and warm if you are about to write over an existing file.

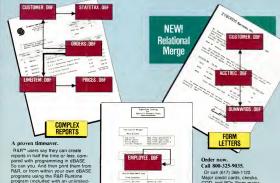
The easiest way to get a copy of COPY-SAFE is to download it by modem from the PC Magazine Interactive Reader Service, as explained in the accompanying sidebar. If you are modemless, the assembler code for COPY-SAFE is shown in Figure 1, and a BASIC program that will produce COPY-SAFE. COM when you run it noce is shown in Figure 2. To activate the program, at the DOS prompt you simply troe in

COPYSAFE



or, better yet, add that name as a line in

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#### ■ PROGRAMMING/UTILITIES

your AUTOEXEC BAT file.

That's all there is to it. The next time, out attempt to copy over an existing file, a warning will appear, indicating the driven and directory, a long with the existing files) that will be copied over. You'll then be given the opportunity either to abort and reconsider your request or to continue when the copying. To continue, press Y and Ener, and DOS will carry out the copy research the copying. To continue, press Y and Ener, and DOS will carry out the copy research the copying the copying the copying to give the copying the copying the copying the copying the continue, press Y and Ener, and DOS will carry out the copy research the copying the

abort the destructive COPY operation.)

The reason for including a drive and directory designation as part of COPY-SAFE's warning can be seen by looking at

■ With COPYSAFE, the next time you try to copy over an existing file, a warning will indicate the drive, directory, and the existing file(s) that will be copied over.

another potentially disastrous scenario. If you entered

and you thought you had made \UPDATE
the current directory on B: but had instead
left B: in its default root directory—where
you kept all your old versions—without
COPYSAFE it's all over.

With COPYSAFE displaying the target drive and directory, however, you can always be sure you are copying to the right place. Moreover, when you do want oo overwrite an outdated file, if COPYSAFE doesn't warm you, you know that whatever cless may be in your intended target drive/directory, your obsolete file isn't among those present.

COPYSAFE is meant to be installed only once. Although it is not difficult to

|                                             | CALL                                                                                                                                                                                                                         | CS:OLD_21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ;Let user enter in the commend.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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|                                             | PUSH PUSH PUSH PUSH PUSH PUSH PUSH PUSH                                                                                                                                                                                      | AX<br>BX<br>CX<br>DX<br>DS<br>ES<br>SI<br>DI<br>BP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | jUpon return, save ell regietere.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             | HOV<br>INT<br>HOV<br>HOV<br>HOV<br>INC<br>XDR<br>HOV<br>CHP                                                                                                                                                                  | AB,2FN<br>21N<br>21N<br>WORD PTR CS:OLD_DTA,BX<br>WORD PTR CS:DLD_DTA(2)<br>S::MATCH_FLAG,#<br>SI,DX<br>SI<br>CH,OM<br>CL,[SI]<br>CX,6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | JRecet the match fleg. JDX points to DOS kbd buffer. JSEcond byte hee bytee reed. JRetrieve bytee reed.                                                                                                                                                                                                                                                                                                                                                            |
|                                             | JB<br>INC<br>MOV                                                                                                                                                                                                             | QUICK_EXIT<br>CX<br>BP,CX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ; to be copy. E.g. (COPY A)<br>;Increment count to include CR.<br>;Dee BP to keep track of bytes.                                                                                                                                                                                                                                                                                                                                                                  |
|                                             | PUSH POP INC POP INC CALL HOW MOV MOV MOV MOV JNE MOV CALL JC HOW CAUL HOW SUB CALL HOW CAUL HOW SUB | CS SI SI OFFSET COMMAND NOVES COMPAND NOVES COMPAND SI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | pitt to point to us.  Front to first type of commend.  Front to fort work space.  Front to our work space.  Front to our work space.  First type commend to our work space.  Front text of commend.  First type commend?  First type commend?  First type commend?  Front text of first parameter.  Front text of first parameter. |
| if the cell<br>the commend.<br>so we can re | JMP<br>e exite<br>ie not<br>The e                                                                                                                                                                                            | SHDRT CK_PARA2  . One exit jumps direct the control of the control | ;Jump eround exit.  tly to the old INT 21; exit efter we proceee; of the main routine; e ee poeable.;                                                                                                                                                                                                                                                                                                                                                              |
| BUSINESS:                                   | POPF                                                                                                                                                                                                                         | CS:DLD_21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Jump to the old DOS routine.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 17:                                         | CMP                                                                                                                                                                                                                          | MATCH_FLAG,1<br>DOME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Did we get e match?                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| NE:                                         | MOV<br>MOV<br>CALL                                                                                                                                                                                                           | QUERY<br>DX, MORD PTR OLD_DTA<br>AX, WDHD PTR DLD_DTA[2]<br>DS, AX<br>SET_DTA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | relee, query if want to continue.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| ICK_EXIT:                                   | POP<br>POP                                                                                                                                                                                                                   | BP<br>DI<br>SI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ;Restore eIl registere.                                                                                                                                                                                                                                                                                                                                                                                                                                            |

;Return.

(Figure I continues

; If no, exit.

EX

DOS

QU:

#### PROGRAMMING/UTILITIES

| CK_PARA2:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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This subroutine will capitalize the command line.

#### DOWNLOADING COPYSAFE

The programs that appear in our Programmingh Utilities columns and all the other programs we publish can be downloaded by modern from the CP Magazine Interactive Reader Service. There is no charge for this service, but users are causioned that these programs are copyright material and are made available only for individual, noncommercial use. You may make copies for others (tracking placement on noncommercial excharge is movement and the angle of the commercial that is a service of the other commercial excharge is movement and angle of the commercial excharge is movement.

#### COPYSAFE AT A GLANCE Syntax:

[d:][path]COPYSAFE

Operation. COPY/SAFE is a nemopresident utility that diplays the filename(s), drive, and directory of any file that will be overwritten by execution of a COPY command issued by the user. It provides a Gefault) opportunity to terminate the COPY procedure or, if desired, to continue the COPY operation and write over a same-named file(s). COPYSAFE support the use of DOS widecards, but it will not wan the control of the command of the least of the COPY operation and the control of the consensation.

COPYSAFE should be loaded only once per session, normally through an AUTOEXEC.BAT file. In any case, it should be loaded after any initializing programs (such as TIME and DATE) that prompt for user input. While it is highly compatible with other memory-resident utilities, the wide variety of TSR programs makes it impossible to usuantee absolute compatibility.



Drives

\$379 NEC P-6 NEC P

> NEC P-5XL PANASONIC 1080 I

STAR NP-10

STAR NX-15

STAR ND-15

STAR NR-15

STAR SD-10

STAR NB 24-15

BROTHER 1509

TOSHIBA P341 \$150

TOSHIBA P351

FUJITSU DLP24

FUITSU DM91

OKIDATA M182

OWIDATA MISS

OWIDATA 2410

EPSON FX-85

OKIDATA M192 -OKIDATA M193 -

PANASONIC 1091 1

PANASONIC 1092

PANASONIC 1592

\$573 NEC P-5

\$183

\$249

\$69 30MB MAYNARD HCARD \$75

\$935

\$108

\$3065 EPSON FX-286

\$225 EPSON LX-80

30 MB SEACATE 65MS

30 MB SEAGATE RILL

20 MB ST4026 AT

30 MB ST4038 AT

AN MR STANSLAT

80 MR STAMS AT

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you also use the Xmodem error-checking protocol; our other files (e.g., with extensions of ASM or .BAS) can be downloaded using either regular ASCII or Xmodem transmission. COPYSAFE.BAS, whether typed

in or downloaded from PC-IRS, will automatically create COPYSAFE COM when run once in BASIC. COPYSAFE ASM, also listed both here and on PC-IRS, allows you to modify the program but requires you to use a macro assembler (IBM or Microsoft) and the following commands:

#### MASH COPYSAFE; LINK COPYSAFE;

EXEZBIN COPYSAFE COPYSAFE. COM

write code to prevent multiple installations, the program was just too long to include that refinement. Therefore, the best place for COPYSAFE is in your AU-TOEXEC.BAT. Note, however, that if you have the commands TIME or DATE or any other commands that pusses for user input, be sure to load COPYSAFE after them.

COPYSAFE attaches itself so DOS

("becomes resident") so that programs can load above it ruber bar programs can load above it ruber than write over it. Using COPYSAFE will cost you approximately 1.7K bytes of RAM, which is a small insurance premium to pay to prevent hastily wiping out a day's for week's) work. The code for COPYSAFE is actually only 1,200 bytes, but if you examine the end of the assembler listing you'll see that an additional 500 bytes have been reserved as a work space for the program.

COPYSAFE'S OPERATION Did you ever wonder what your machine is doing when it's at the DOS prompt? Apart from bugging you with its incessant blinking cursor ("enter something, enter something, enter something") the machine seems idle. In fact. COMMAND.COM is

| CAPITALIZE:                                                     | MOV                                                                                                                                                                                                                                                                                                                                                                                                          | SI, DPPSET COMMAND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Point to command line.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CK CAP:                                                         | CNP                                                                                                                                                                                                                                                                                                                                                                                                          | CX, BP<br>RYTE PTR (ST1.'a'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ;Get length of commend.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                 | .78                                                                                                                                                                                                                                                                                                                                                                                                          | BYTE PTR [SI], 'a'<br>NEXT_CAP<br>BYTE PTR [SI], 'z'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ; If the byte is between<br>; "a" and "z", cspitalize<br>; by atripping the 5th bit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                 | CMP                                                                                                                                                                                                                                                                                                                                                                                                          | BALE LAS [21]'. I.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | y'a' and 'z', capitaliza                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                 | AHD                                                                                                                                                                                                                                                                                                                                                                                                          | NEXT_CAP<br>BYTE PTR [SI],5FR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | joy deripping one sen bit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| NEXT_CAP:                                                       | LOOP                                                                                                                                                                                                                                                                                                                                                                                                         | SI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| These subrou                                                    | tines                                                                                                                                                                                                                                                                                                                                                                                                        | are INT 21 DOS functio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | n calls. ;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| SET_DTA:                                                        | HOV                                                                                                                                                                                                                                                                                                                                                                                                          | AN, 1AR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Sat disk transfer address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| 7 This subrout                                                  | ine wi                                                                                                                                                                                                                                                                                                                                                                                                       | ll find the start of a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | parameter.;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| PARA_START:                                                     | CHP                                                                                                                                                                                                                                                                                                                                                                                                          | BYTE PTR [BX],32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ; In it apace character or beli                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                 | JBE<br>CMP                                                                                                                                                                                                                                                                                                                                                                                                   | NEXT_START<br>BYTE PTR [BX],'/'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ; If yas, gat mext character,<br>; Is it the switch character?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                 | JNI                                                                                                                                                                                                                                                                                                                                                                                                          | END_START                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | rIf no, we have the start.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                 | INC                                                                                                                                                                                                                                                                                                                                                                                                          | BX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ;Elea, adjust pointers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                 | DEC<br>JE                                                                                                                                                                                                                                                                                                                                                                                                    | BP<br>END_COM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ; If and of command, no parama-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| NEXT_START:                                                     | INC                                                                                                                                                                                                                                                                                                                                                                                                          | BX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Adjust pointers to mext char                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                 | DEC                                                                                                                                                                                                                                                                                                                                                                                                          | BP<br>PARA_START                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| END_COM:                                                        | JNZ<br>STC                                                                                                                                                                                                                                                                                                                                                                                                   | 1100000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ;Indicate found parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                 | STC                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ; Indicate found parameter<br>; by setting carry flag.<br>• Indicate did not find parame                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| END_COM:<br>END_START:                                          | STC                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ; Indicate found parameter<br>; by estting carry fleg.<br>; Indicate did not find parame<br>; by clearing carry flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| END_START:                                                      | STC<br>RET<br>CLC<br>RET                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ; by clearing carry flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| END_START:                                                      | STC<br>RET<br>CLC<br>RET                                                                                                                                                                                                                                                                                                                                                                                     | ll find the and of a p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ; by clearing carry flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| END_START:                                                      | BTC<br>RET<br>CLC<br>RET                                                                                                                                                                                                                                                                                                                                                                                     | ll find the and of a p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ; by clearing carry flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| END_START:                                                      | ETC<br>RET<br>CLC<br>RET                                                                                                                                                                                                                                                                                                                                                                                     | 11 find the and of a p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ; by clasting carry flag; sameater.; shdjust pointers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| This subrout                                                    | ETC<br>RET<br>CLC<br>RET<br>INC<br>DEC<br>CMP<br>JBE                                                                                                                                                                                                                                                                                                                                                         | BX BP BYF FTR (BX),32 END.PARA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ; by clasting carry flag; rAdjust pointers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| END_START:                                                      | ETC<br>RET<br>CLC<br>RET<br>Lina wi<br>INC<br>DEC<br>CMP<br>JBE<br>CMP                                                                                                                                                                                                                                                                                                                                       | BX BY BYR [BX],32 BND_FARA BYFE [TR [BX],7/*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ; by clasting carry flag.  aramater.;  ;Adjust pointers. ;Is it space character or bel ;If yes, found and.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| END_START:                                                      | ETC<br>RET<br>CLC<br>RET<br>CLC<br>RET<br>INC<br>DEC<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP                                                                                                                                                                                                                                                              | BX<br>BY<br>BYF PTR (BX),32<br>END_PARA<br>BYTE PTR (BX),72<br>PARA_END (BX),"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ; by clearing carry flag.  aramater.;  ¡Adjust pointers.  ¡Is it apace character or bel. ¡If yes, found and.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| END_START;<br>; This subcout;<br>PARA_END;                      | ETC<br>RET<br>CLC<br>RET<br>Cina wi<br>INC<br>DEC<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBP                                                                                                                                                                                                                                                                        | BX SP SPF PTR (BX),32 END_PARA END SPTE PTR (BX),// PARA_END PARA_END SPTE PTR (BX), #                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | pidjust pointara,<br>jia jut apaca charactar or bel.<br>jii jis paca, found and.<br>jia it switch character?<br>jii no, gat naxt charactar.<br>pilan, raplace with ancifor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| END_START:                                                      | ETC<br>RET<br>CLC<br>RET<br>CLC<br>RET<br>INC<br>DEC<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP                                                                                                                                                                                                                                                              | BX<br>BY<br>BYF PTR (BX),32<br>END_PARA<br>BYTE PTR (BX),72<br>PARA_END (BX),"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ; by clasting carry flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| END_START; ; This subrout ; PARA_END; END_FARA;                 | ETC<br>RET<br>CLC<br>RET<br>INC<br>DEC<br>CHP<br>JBE<br>CMP<br>JBE<br>CMP<br>JN2<br>HOV<br>JRE<br>HOV<br>JRE<br>ROV<br>RET                                                                                                                                                                                                                                                                                   | BX BY BY BY BYE PTR (BX), 12 BYE PTR (BX), 12 BYE PTR (BX), 14 BEGORY PARA, END BYTE PTR (BX), 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ; by clasting carry flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| PARA_END:                                                       | ETC<br>RET<br>CLC<br>RET<br>INC<br>DEC<br>CHP<br>JBE<br>CMP<br>JBE<br>CMP<br>JN2<br>HOV<br>JRE<br>HOV<br>JRE<br>ROV<br>RET                                                                                                                                                                                                                                                                                   | Ill find the end of a p<br>BX<br>BP<br>BYE FTR (BX), 32<br>END_PARA<br>END_PARA<br>END_PARA<br>END_PARA<br>END (BX), #<br>END (FARA<br>END (BX), #<br>END (FARA<br>END (BX), #                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ; by clasting carry flag.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| END_FARA:  ; This subrout  FARA_END;  END_FARA:  ; This subrout | ETC<br>RET<br>CLC<br>RET<br>INC<br>DEC<br>CMP<br>JBE<br>CMP<br>JBE<br>HOW<br>JRP<br>HOW<br>PET                                                                                                                                                                                                                                                                                                               | BY FIRE (BX), 22 BYTE FTR (BX), 22 BYTE FTR (BX), 22 BYTE FTR (BX), 42 BYTE FTR (BX), 8 BYTE FTR (BX), 8 BYTE FTR (BX), 8 BYTE FTR (BX), 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | py clearing carry flag.  **Adjust pointers.  **Jaint appear character or bellif yes, found end.  **Jif its agric moderacter or just the state character.  **Jif its agric moderacter.  **Jif i |
| END_FARA:  ; This subcout  PARA_END:  END_FARA:  ; This subcout | ETC<br>RET<br>CLC<br>RET<br>LINC<br>DEC<br>CMP<br>JBE<br>CMP<br>JND<br>HOV<br>JBP<br>HOV<br>JBP<br>HOV<br>PET<br>LINE WILL<br>HOV<br>HOV                                                                                                                                                                                                                                                                     | Ill find the end of a p  BX BY BYE FFR [BX], 22 BND, PARA BYE FFR [BX], 29 PARA, END BYE FFR [BX], 8  Ill check to sea if per BX, DX BX BX, DX BX BX, DX BX | ; by clasting carry flag.  **Temater.**  **Adjust pointage.  **Ja it spec classetter or bel.  **Ja  |
| END_FARA:  ; This subrout  FARA_END;  END_FARA:  ; This subrout | ETC<br>RET<br>CLC<br>RET<br>INC<br>DEC<br>CMP<br>JBE<br>CMP<br>JBE<br>HOV<br>RET                                                                                                                                                                                                                                                                                                                             | Il find the end of a p  BX BY BYE FTE (BX), 32 END. PARK (BX), ''' PARK, DED ENTE FTE (BX), A  BYE FTE (BX), A  BYE FTE (BX), A  LI chack to see if par  DX,DX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | py clearing carry flag.  **Adjust pointers.  **Jaint appear character or bellif yes, found end.  **Jif its agric moderacter or just the state character.  **Jif its agric moderacter.  **Jif i |
| PARA_END:                                                       | STC<br>RET<br>CLC<br>RET<br>LINC<br>DEC<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>CMP<br>JBE<br>MOVE<br>MOVE<br>MOVE<br>MOVE<br>MOVE<br>MOVE<br>MOVE<br>MOV | Il find the and of a p  BX  BX  BX  BX  BX  BX  BX  BX  BX  B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ; by clearing carry flag.  ***remails**,  **/Adjust pointers.  **/It it space cheercter or belling to the control of the contr |

```
FIND_END:
                                                                        Find the end of parameter.
                                   BYTE PTR [DI], F
                        CRP
CRP
CRP
CRP
CRP
JI
                                   BYTE PTR [DI-1],':"
                                                                               ; is it drive only?
; if yee, path request.
; is it root only?
; if yee, path request.
; is it **.*?
                                   BYTE PTR [DI-1].'\"
                                   BYTE PTR [DI-1], ***
CK_FATE_END
                                                                                if yes, not path request.
                        HOV
CALI
JNC
POF
JRF
CMP
JNE
                                   CX,188
                                   FIND_FIRST
CK_DIR
                                                                                :If it dossn't exist, exit.
                                   BYTE PTR DESTINATION+21,16H
CK_PATH_END
CK DIR:
                                                                               ;Is it directory?
;If no, not path request.
;Do we need to add "\"?
                                   SYTE PTR [DI],'\'
                                          PTR [DI],'\'
                                                                               ; If yee, do so. ; And adjust pointer.
ADD PATH
FATE .
                                                                                ; Indicets found path.
CK_PATH_END:
                                                                                Indicets path not found.
This subroutine will seen off the path by looking for "\" and ":". ;
SCAN_OFF:
                                   cx,cx
                                                                       ;Sero in counter.
;Is it "\"?
;If yee, got path.
;Ie it ":"?
                                   SYTE PTR [SI-1],'\'
NEXT_SCAN:
                        CH P
                                   END_SCAN
BYTE PTR [SI-1],':
                                                                        ; If yee, got path, ;Else, edjust pointsre.
                                   ERD_SCAN
                        CMP
                                   CX . DX
                                                                        ; If st start of pare, no path.
                                   NEXT SCAN
END_SCAN:
This subroutine will display a string until it comes to a zero.
                                                                       ;Get e byte.
;Is it s zero?
;If yes, we sre done hers.
;Else, print it.
;And get next cheracter.
ASCIII PRINT-
                                   AL, 6
FRINT_END
                                   PRINT_CHAR
SEDRY ASCIIZ_PRINT
                        JRP
PRINT END:
  This subroutine will compare each matching source with sach ;
terget to determine if the terget exists. If there are any ;
global cherecters, only those positions will be compared.;
CORPARE:
                        MOV
                                  SI,DFFSET SOURCE+38
DI,DFFSET DESTINATION+38
GLOBAL_FLAG,1
                                                                               ; Point to source and ; terget filenames.
                        HOV
                        JΣ
                                  GLOBAL
                                                                               ido a global compare.
NEXT_COMP :
                        CMP
                                                                               Are the bytes the same?
                                  NO_MATCH
                        JHE
                                                                               ; If no, no match. ;Ars ws st and of filename?
                       CRF
JRS
JRF
                                  BYTE PTR [DI-1], #
MEXT_CORF
SHORT MATCH
                                                                               ; If no, get next byts. ; Elss, we have a match.
                                  BP, DFFSET DESTINATION+2
BX, BX
GLOBAL:
REXT_BALF:
                                                                               ;Point to DOS work space.
NEXT LENGTE:
                        CHP
JI
                                  BYTE PTR [DI+BX],'.'
                                                                               Get length of target by
                        CKF
                                  BYTE PTR [DI+BX],6
                        INC
                                  BX
SEDRT NEXT_LENGTH
GOT LENGTH .
                                  CX, BX
REXT BYTE:
                                                                       ;Did we get to end of cource
; before we got end target?
;If yes, no match.
                       CHP
JI
CHP
JI
CHF
JI
INC
                                  BYTE PTR [61],"."
                                  BYTE PTR [61],6
RD_MATCH
                                           PTR DS:[BF],'7'
                                                                       ; Is it s global char request?
; If yes, compare.
;Else, edjust pointers.
                                  CORP_BYTE
                                                                                                  (Figure I continues)
```

in charge and it gets your command by issuing an interrupt 21h, function call 0Ah. That's the buffered keyboard input, a DOS That's the control keyboard input, a DOS keyboard for input. This call is entered with DESDX registers pointing to a buffer area that has been set aside to receive your keystrokes. The first byte of the buffer specifies the number of characters the buffer can bold. The buffer size is declared by the calling program, and in this case to the buffer of the buffer size is declared by the calling program. And in this case to the buffer of the buffer size is declared by the calling program. The buffer size is declared by the calling program. The buffer size is declared by the calling program and in the buffer size in the time of the buffer size is declared.

■ After saving the old interrupt 21h vector, COPYSAFE substitutes its own vector. Thus, whenever an INT 21h is issued, COPYSAFE is called upon first.

less than the maximum number of characters it can hold, each additional character is ignored and the beep is issued.

When Enter is read, the second byte of the buffer is filled with the number of bytes received, excluding the carriage return, which is always the last character. Control is then returned to the caller. COM-MAND.COM. Upon return, COM-MAND.COM is not return, COM-MAND.COM is not see if what you typed is one of its internal commands. COPY is one of those commands.

After saving the old interrupt 21h vector. COPYSAFE substitutes its own vector. Thus, whenever an INT 21h is issued.
COPYSAFE is called upon first. COPYSAFE looks at register AH (AH determines which function DOS is to carry out).
and if OAh is found and if it is COMMAND. COM that is making the request.
COPYSAFE pushes the flags on the stack
and calls on INT 21 to get the user input.
This imitates an INT instruction, so when

#### ONIY BECAUSE YOU SELL ONE OF

FOR RETAILERS



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■ PROGRAMMING/UTILITIES

|             | JNP   | SBORT NEXT_WILD         |        | get neet byte.               |
|-------------|-------|-------------------------|--------|------------------------------|
| COMP_BALE!  | CMPSB |                         |        | the bytes the same?          |
|             | JM2   | ND_KATCH                | ,If :  | o, no match.                 |
| NEXT_WILD:  | LOOP  | BP                      | 140)0  | at pointer.                  |
|             | LOOP  | NEXT_BTTE               | , Get  | next byte.                   |
|             | CMP   | BYTE PTR [DI],8         | Are    | we at end of target?         |
|             | JNS   | CK EXTEN                | ilf :  | o, get extension.            |
|             | CMP   | BYTE PTR [SI] . 0       | IIf v  | es, are we end of source?    |
|             | JΣ    | HATCH                   | Ilf y  | se, we have match.           |
|             | CMP   | BYTE PTR DS: [BP], '?'  | 181.00 | , is global request?         |
|             | JNZ   |                         |        | o, we have a match.          |
|             | JMP   | SNORT ND_MATCH          | Elee   | , no match.                  |
| CK EXTEN:   | INC   | DI                      | +Bump  | pointer past "."             |
| NEXT_EXTEN: | CMP   |                         | Are    | we at and of source?         |
|             | JE    | ND_HATCH                | rif v  | ee, no match.                |
|             | INC   | 81                      |        | Elee get eetsneion.          |
|             | CMP   | BYTE PTR [SI-11.'.'     |        | iby looking for "."          |
|             | JK2   | NEXT_EXTEN              |        |                              |
|             | MOA   | BP, OPFSET DESTINATION+ | 10     | Adjust DOS work space.       |
|             | JHP   | SNDRT NEXT_HALP         |        | Get setencion of filename.   |
| MATCH:      | CNP   | MATCH FLAG.1            |        | Is this the first match?     |
|             | Jž    | GO_PRINT                |        | ilf no, skip warning.        |
|             | CALL  | PRINT WARNING           |        | :Else, print warning.        |
| GO_PRINT:   | MOV   | AL,9                    |        | Print a tab to indent.       |
|             | CALL  | PRINT_CRAR              |        |                              |
|             | MOV   | SI, OFFSET DESTINATION+ | 30     | ; Point to filename to print |
|             | CALL  |                         |        |                              |
| CR_LP:      | MOV   |                         |        | ;Add carriage return.        |
|             | CALL  | PRINT_STRING            |        |                              |

This subroutine will check for any global characters in target.

| CE GLOBAL:   | MOV   | GLOBAL FLAG. 8  | Reset global flag.      |
|--------------|-------|-----------------|-------------------------|
| CACALLANDI   | HOV   | SI, PARAZ_START | Point to target.        |
| NEXT GLOBAL: | LDDSB |                 | :Get a byte.            |
|              | CMP   | AL. ' · ·       | :Get a byta.            |
|              | JE    | POUND GLOBAL    | If yes, got global.     |
|              | CHP   | AL. 121         | 118 It "?"?             |
|              | 32    | POUND_GLOBAL    | ; If yee, got global.   |
|              | CHP   | AL. 0           | ; Is it and of paramate |

GLOBAL\_FLAG,

This subroutine will print the warning and directory of the target.

in DS

(Figure 1 continues)

Enter is pressed, control will be returned to COPYSAFE instead of COMMAND .COM.

NO MATCH

POUND\_GLOBAL:

COPYSAFE then looks at the input to see if you entered COPY. If found, COPYSAFE determines if the target file exists and issues the appropriate warning.

If COPY is not found, no action is taken other than returning to COMMAND .COM. If, on entry, a function request other than 0Ah is found in AH, or if it is not COMMAND.COM making the request. control is transferred directly to DOS by jumping to the stored vector. This time, control will be passed back to the caller, bypassing COPYSAFE.

Function call 0Ah can be issued by any program that wants DOS to handle user input. COPYSAFE, however, is interested

the call. When you install COPYSAFE, it terminates but stays resident by issuing INT 27. This interrupt, after noting the end of COPYSAFE, returns control back to COMMAND.COM, the processor that loaded COPYSAFE in the first place. After some housekeeping, COMMAND .COM issues INT 21 function 0Ah to get your next command. Thus, control is immediately returned to COPYSAFE, Upon this entry and only this entry, COPYSAFE stores the DS and DX values as signatures of DOS. Remember, I said that the caller places in DS:DX the pointer to the input buffer. Now COPYSAFE can tell if it is COMMAND.COM issuing the buffer keyboard input call by examining the value

only when COMMAND.COM has issued

version

COPY is one of the original commands

of DOS. There are three formats for

COPY. If you give COPY one argument,

this argument is considered the source and

the default drive and directory is consid-

ered the target. If you give two arguments,

the first is the source and the second the

target. And finally, if you include the

"+", the files are concatenated. (That's a



it ignores COPY operations that concate-

nate files. You should note, further, that if

you use COPY in a batch file, COPY-

SAFE will not have a chance to respond.

Batch files are processed directly by

COMMAND.COM and function call 0Ah

is not involved. Except for these limita-

tions and for a few bizarre cases, however,

COPYSAFE will catch 99 percent of your

global requests. My idea of a bizarre re-

#### PROGRAMMING/UTILITIES

quest would be something like this:

COPY TEST???? \TESTDIR\A???????

If the target is not a directory or does not contain global characters and is found to exist already, it is displayed. In all other cases, COPYSAFE determines if a target filename exists by issuing the paired DOS calls, 04Eh (find first matching) and 04Fh (find next matching). Find first is issued only once, with all subsequent calls referred to by find next.

To start, the first matching filename

■ To start, the first matching filename meeting the source request is found. Then all the matching filenames meeting the target request are found.

meeting the source request is found. Then all the matching fienames meeting the target request are found. When this is exhausted, the next matching source finame is found, and we return to finding all matching target filenames. This continues until there are no more matching source filenames.

When the first letter of a filename indi-

cates a potential match, a comparison is made byte by byte. If the two filenames an the same, it is considered to be one of the files that will be overwritten, and so is re ported to you. There is an exception to the comparison. If global characters are in cluded, only those positions that are wild in the target are checked as matching.

in the target are checked as matching.

Once all the existing files are displayed,
you are given the opportunity to abort. It
the line

Do you wish to continue (Y/N)? N

is displayed using the regular DOS func-

|                                                                                             | CALL                                                                                                                | END_WARNING<br>ASCIIE_PRINT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | And display.                                                                          |
|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| END_MARNING:                                                                                |                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Double space                                                                          |
|                                                                                             | CALL                                                                                                                | PRINT_STRING<br>PRINT_STRING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Double space; by printing to carriage; raturns and linefasde.                         |
|                                                                                             | CALL                                                                                                                | PRINT_STRING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | , raturns and linefeade.                                                              |
|                                                                                             | CMP<br>JN2                                                                                                          | PATR_FLAG, 1<br>DRIVE_ONLY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ;Did we change directory?                                                             |
|                                                                                             | MOV                                                                                                                 | DX, OFFSET SOURCE_DIR, "                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                       |
|                                                                                             | MOV                                                                                                                 | DX, OFFSET SOURCE_DIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                       |
| DRIVE_ONLY:                                                                                 | POP                                                                                                                 | CHANGE_DIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ; If yes, restore target directo                                                      |
| DATA D'OUT 1                                                                                | MOV                                                                                                                 | AR. ØEH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | gReetore the drive se well.                                                           |
|                                                                                             | INT                                                                                                                 | 218                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
|                                                                                             | MOV<br>CALL                                                                                                         | ETTE PTR CURRENT_DIR,<br>DX,DFFSET CURRENT_DIR<br>CHANGE OIR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ' ;Now restors default drive'; directory.                                             |
| , This subrou                                                                               | RET                                                                                                                 | 11 ask if you wish to or                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | intinua. If no, the first ,                                                           |
| byts of the                                                                                 | COMMEN                                                                                                              | d line will be replaced                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ntinus. If no, the first ;<br>with e carriege return. ;                               |
| QUERY:                                                                                      | MOV                                                                                                                 | DX.OFFSET QUERY_STRING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1                                                                                     |
|                                                                                             | CALL                                                                                                                | PRINT_STRING<br>AX, 0 E 0 6 H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Print the string.                                                                     |
|                                                                                             | INT                                                                                                                 | 108                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ;Back the cursor up one by<br>; printing BS (8) TTY.                                  |
| INKEY:                                                                                      | NOV                                                                                                                 | AR,7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Gat a keyetroke.                                                                      |
|                                                                                             | INT                                                                                                                 | 218                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                       |
|                                                                                             | CHP                                                                                                                 | AL, 27<br>CANCEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ; Is it Esc?<br>; If yse, cancel COPY                                                 |
|                                                                                             | CMP                                                                                                                 | AL, 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |
|                                                                                             |                                                                                                                     | RESPONSE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ; If yas, gat reeponee.<br>; Capitaliza kayatroka.<br>; Is it "Y"?                    |
|                                                                                             | AND                                                                                                                 | AL,5PH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Capitaliza kayatroks.                                                                 |
|                                                                                             | CMP                                                                                                                 | AL, 'Y'<br>PRINT_REY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Is it 'Y'?                                                                            |
|                                                                                             | CMP                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ; If yes, print it.                                                                   |
|                                                                                             | 32                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ilf yee, print it.                                                                    |
|                                                                                             | MOV                                                                                                                 | AX. SESTS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ;Else, print bell charecter et<br>; current cursor position.                          |
|                                                                                             | INT<br>JMP                                                                                                          | 18H<br>SSDRT INKEY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ; current cursor position.<br>; and get next keystroks.                               |
| PRINT_REY:                                                                                  | XDR                                                                                                                 | EE,BH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Frint the character at                                                                |
|                                                                                             | MOV                                                                                                                 | CX,1<br>AH, BAR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ; the current cursor position.                                                        |
|                                                                                             | INT                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       |
|                                                                                             | JMP                                                                                                                 | SHORT INSEY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ¡Get next keyetroke.                                                                  |
| RES PONEE:                                                                                  | XOR                                                                                                                 | ER, BE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |
|                                                                                             | HOV                                                                                                                 | All, 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ) Gat character at current                                                            |
|                                                                                             | INT                                                                                                                 | AL,'Y'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ; cureor poeition.                                                                    |
|                                                                                             | 32                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | j cureor position,<br>jIs it "Y"?<br>jIf yse, dons hers.<br>jElse, it must be "N" end |
| CANCEL:                                                                                     |                                                                                                                     | BX. EBD EUFFER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | glise, it must be "N" end                                                             |
|                                                                                             | NOV                                                                                                                 | AX,DOS_SEG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ; cancel request by putting e<br>; CR in first byte of DOS                            |
|                                                                                             | VON                                                                                                                 | ES, AX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ; CR in first byte of DOS<br>; command line buffer.                                   |
| END_QUERY:                                                                                  | RET                                                                                                                 | D.10 110 101(DAY2)/13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | , commune 11.00 Dullel.                                                               |
| This routing                                                                                | e insta                                                                                                             | lls this program in the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | path of ;                                                                             |
|                                                                                             |                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                       |
| ,                                                                                           |                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | :Cat DOS 21 interrupt.                                                                |
| INITIALIZE:                                                                                 | HOV                                                                                                                 | Ax,3521h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | lene nos ar incertabe.                                                                |
| ,                                                                                           | INT                                                                                                                 | 2111                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                       |
| ,                                                                                           |                                                                                                                     | AX,3521h<br>21H<br>WORD PTR OLD_21,BX<br>WDRD PTR OLD_21[2],ES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ;Savs old interrupt.                                                                  |
| ,                                                                                           | HOV<br>HOV                                                                                                          | 21H<br>MORD PTR OLD_21,BX<br>WDRD PTR OLD_21[2],ES<br>DX,DFFEET NEW_21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |
| ,                                                                                           | HOV<br>HOV                                                                                                          | 21H<br>MDRD PTR OLD_21,EX<br>WDRD PTR OLD_21[2],ES<br>DX,DFFEET NEW_21<br>Ax.2521h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ;Save old interrupt.                                                                  |
| ,                                                                                           | HOV<br>HOV<br>HOV<br>INT                                                                                            | 21H<br>MORD PTR OLD_21,BX<br>WDRD PTR OLD_21[2],ES<br>DX,DFFEET NEW_21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ;Save old interrupt.                                                                  |
| ,                                                                                           | HOV<br>HOV                                                                                                          | 21H<br>MDRD PTR OLD_21,BX<br>MDRD PTR OLD_21[2],ES<br>DX,DFFEET NEW_21<br>AX,2521h<br>21B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ;Save old interrupt.                                                                  |
| JAPA2                                                                                       | HOV<br>HOV<br>HOV<br>INT<br>HOV<br>INT                                                                              | 21H MORD PTR OLD_21, MX MORD PTR OLD_21[2], ES DX, DFFEET NEM_21 AX, 2521h 21B CX, OFFSET END_RESIGNY 27h INITIALIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | pSave old interrupt.  pInstall new interrupt.  pTerminate but stey resident.          |
| JAPAZ                                                                                       | HOV<br>HOV<br>HOV<br>INT<br>HOV<br>INT                                                                              | 21H MORD PTR OLD_21, MX MORD PTR OLD_21(2), ES DX,DFFEET NEM_21 AX,2521h 21B CX,OFFSET END_RESIGN2 27h INITIALIEE PARA2738                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | pSave old interrupt.  pInstall new interrupt.  pTerminats but stey resident.          |
| PARA2 COMMAND DESTINATION                                                                   | HOV<br>HOV<br>HOV<br>INT<br>HOV<br>INT                                                                              | 21H MORD PTR OLD_21, MX MORD PTR OLD_21(2), ES DV, DFFEET NEW_21 AX, 2521h 21B OX, OFFSET END_RESIGENT 27h INITIALIEE FARA2+78 COMMAND-148                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | pSave old interrupt.  pInstall new interrupt.  pTerminate but stey resident.          |
| TARAZ COMMAND DESTINATION BOOKE                                                             | HOV<br>HOV<br>HOV<br>INT<br>HOV<br>INT<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU                                           | 21H MDRD PTR OLD_21,EX MDRD PTR OLD_21[2],ES DX.DFFEET NEM_21 AX,2521h 21B CX.OFFSET END_RESIGNN 27h INITIALIE COMMAND-146 DESTINATION-64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | pSave old interrupt.  pInstall new interrupt.  pTerminate but stey resident.          |
| TARAZ COMMAND DESTINATION BOOKE                                                             | HOV<br>HOV<br>HOV<br>HOV<br>INT<br>HOV<br>INT<br>EQD<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU        | 21H MDRD FTR OLD_21,EX MDRD FTR OLD_21[2],ES DX.DFFEET NEM_21 2X,252Lb ZIB 21B ZIB 27B ZIB 27B ZIB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ;Savs old interrupt. ;Install new interrupt. ;Terminats but stey resident.            |
| TARA2  OMMAND DESTINATION SECRET OIR SECRET OIR SECRET OIR SECRET OIR SECRET OIR SECRET OIR | HOV<br>HOV<br>HOV<br>HOV<br>HOV<br>INT<br>HOV<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU | 21H MORD PTR OLD_21, EX MORD PTR OLD_2121, ES MORD PTR OLD_2121, ES EX, PTSET IMM_21 AX, 2521h CX, OFFSET IMM_21 AX, 2521h INITIALIES PARA2-78 COMMAND-148 EXCENCE-64 EXCENCE-64 EXCENCE-64 MORE IMM_210F-64 MORE IMM_210F-64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | pSave old interrupt.  pInstall new interrupt.  pTerminate but stey resident.          |
| PARA2 COMMAND DESTINATION SOURCE CURRENT_OIR KOMEING DIR                                    | HOV<br>HOV<br>HOV<br>INT<br>HOV<br>INT<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU                      | 21H MDRD FTR OLD_21,EX MDRD FTR OLD_21[2],ES MDRD FTR OLD_21[2],ES EX, 2521h EX, 2521h EX, 2521h EX, 2521h EX, 2621h EX, 0FFSET END_RESIGNN 27h EX, 0FFSET E | pSave old interrupt.  pInstall new interrupt.  pTerminate but stey resident.          |
| TARA2  OMMAND DESTINATION SECRET OIR SECRET OIR SECRET OIR SECRET OIR SECRET OIR SECRET OIR | HOV<br>HOV<br>HOV<br>HOV<br>HOV<br>INT<br>HOV<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU<br>EQU | 21H MORD PTR OLD_21, EX MORD PTR OLD_2121, ES MORD PTR OLD_2121, ES EX, PTSET IMM_21 AX, 2521h CX, OFFSET IMM_21 AX, 2521h INITIALIES PARA2-78 COMMAND-148 EXCENCE-64 EXCENCE-64 EXCENCE-64 MORE IMM_210F-64 MORE IMM_210F-64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | pSave old interrupt.  pInstall new interrupt.  pTerminate but stey resident.          |

```
-- BASIC PROGRAM TO CREATE COPYSAPE, COM

N "COPYSAPE, COM" AS $1 LEN = 1
                                                                                                                   HESUM = LIMESUM + BYTE
(BYTE < 256) THEN LEET AS = CHRS(SYTE)
                                            NEXT J
READ LINECKECK
19 LINECKECK & LINESUM THEM PRINT "SELECT IN LINE", 288 + 18 * I
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       54,
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```

tion call (09h, display string), the cursor is located one position to the right of the "N" ready for the next print. I wanted the cursor under the "N" however, so the sear would focus on this six the entry point. see you like 100 per 100

#### ■ When a correct response ("Y" or "N") is detected, instead of using DOS to print the character and advance the cursor, BIOS is called upon for the job.

as a destructive backspace and so erases the character at the left of the cursor. This is not desired in this case.) If neither "Y" nor "N" is pressed, the bell character (07) is printed in the same manner and the user is prompted with that annoying beep.

When a correct response ("Y" or "N") is detected, intested of using DOS to print the character and advance the cursor, BIOS is called upon for the job. INT 10h function (Ah is write character only a the current cursor position. This leaves the cursor flashing always at the same position, which is the entry point for user response. When the Enter key is detected, to the cursor of the cursor o

CANCELING COPY If the response is
"Y", COPYSAFE simply exits to COMMAND.COM to let it do the business of
copying files—in this case, consciously

#### ■ PROGRAMMING/UTILITIES

1335 1000 DATA 218, 246, 37, 14, 8, 95, 33, 79, 195, 178, 1020 DATA 42 139, 122, 248, 76, 195, 186, 71, 3, 180, 33, 9, 285, 33, 38, 285, 188, 33, 195, 226, 180, 33, 208, 180, 33, 63, 1040 DATA 119, 195, 285, 128, 26, 195, 285, 33, 78, 195, 285, DATA 973 DATA 205, 981 736 585 195 1110 DATA DATA DATA DATA 195, 47, 77, 128, 63 32, 110, 116 128, 1128 117, 128, 117, 249 195 67, 215, 1140 DATA 198 198, 139, 239, 247, 61, 116, 128, DATA DATA DATA DATA 61, 117, 128, 255, 52, 125, 92, 1168 1178 1188 128, 48, 125, 116, 128, 255, 255 116 116 16, ě, 149, 1280 DATA 148, 88, 16. 233, 1216 195, 12, 65, 8, 195, 1218 DATA 11, 92, 128, 255, 114, 1238 1248 1258 DATA DATA DATA 248, 255, 116, 128, 1186 1268 238, 188, 191, 195, 255, 184, 246 116 232, DATA 1266 6, 168, 247, 128, 81, 128, 189, 116, 1, 125, 156, 62, 119, 84, 48, 67, 116, 128, 235, 128, 1290 1300 1310 DATA 118, 11, 117, 219, 128, DATA 116 13 40 116 166 63, 117. 116 81, 126 DATA 62. 1368 1378 117, 128, 8, 68, 46, 128, DATA 128, 128, 255, 175, 63, 8, 117, 62, 8, 28, 39, 189, 235, 70, 164, 71, 124, 235, DATA 1400 244, 116, 1428 ATAG 232 230, 1448 1458 1468 1478 232, 116, 117, 195, 198 1, 42, 0, 1, 81, 195 198, 60, 471 841 DATA DATA DATA DATA DATA DATA 195 83, 254, ě, 1488 172 1500 27 25, 285 88, 46, 117, 65, 190, 78, 22, 188, 1528 1538 138, 126, 128, 155, 14, 248, 1, 248, 1, 74, 92, 15 48 1558 DATA 205, 245, 236, 202, 21, 138, DATA 117, 78, 32, 255, DATA 59, 254, 254, 254, 254, 254, 254, DATA 124, 116, 285, 58, 254, 62, 1638 DATA DATA DATA 232, 33, 232, 190, 136, 232, 178, 232, 68, 188, 1181 888 1353 1818 92, 232, 54, 254, 24, 11, 7, 1688 DATA 90 208 232, 1680 1690 1700 1710 1720 1730 ATAD ATAD ATAD 120, 1, 92, 180, 92, 186, 14, 27, 188, 93, 7, 98, 7, 195, 8, 68, 36, 116, 227, 253, 265, 116, 188, 172, 285, 116, 232, 198 26 1 16 42 89 7 548 1281 1899 558 188, 33, 28, 78, 235, 18, 38, 38, 53, 6, 95, 68, 184, 255, 116, 1768 16, 1, 50, 116, 1174 1788 1798 1888 1818 188, 188, 139, 235, 60, 161, 216 89 66 13 912 929 488 851 737 618 984 14, 142, 184, 184, 285, 68, 198, 205, 84, 205, 195, 33, 148, 33,

overwriting them. If the response is "N" or Esc, COPYSAFE cancels the command by placing a carriage return in the third byte of the buffer, the first byte of the command.

mand. My first attempt at canceling the command involved placing a zero in the second byte of the buffer. Remember, that position is reserved as the length of the command. However, COMMAND. COM apparently does not check the returned length but instead just looks for a carriage return to mark the end of the command. Thus when lift finds that the first character is a carriage return, no further processing is done and a new prompt is displayed. If you use

 I've been using COPYSAFE in my own AUTOEXEC.BAT for many months now without difficulty, and many's the time it has saved me grief.

Michael J. Mefford is a microcomputer consultant in Gleneden Beach, Oregon, and a frequent contributor to PC Maga-

(Figure 2 ends)

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## **SPREADSHEET CLINIC**



A baffling bug in the @@ function, protecting files from mistaken saves, a /Range Input equivalent with testing capabilities, and speeding up Framework II MOVEs.

#### A 1-2-3 @@ FUNCTION OURK

There is an odd quirk in 1-2-3's @@ function that I thought I would pass along. In a blank spreadsheet, enter the values in cells C3, C5, and C8 from Figure 1, C3 is a plain number, 4, and the other two cells contain the formulas displayed in column E. Note that the long formula in C8 is just a roundabout way of referencing cell C5. As you change the value in cell C3 to, say, 5, C5 and C8 will change to 50.

Now, copy these three cells to some other place in the worksheet, say D3. The cell with the @@ formula (D8) will now have the value 0. If you change the value in D3 to 6, D5 will naturally become 60, but D8 will show the value it should have had just after you copied it, namely, 50. If you change D3 to 7. D8 will update, but will still lag by one step and display a value of 60 instead of 70. Every time you change D3, D5 will show the right value, but D8 will always be a step behind.

Stranger still, if you now go to D8 and hit F2 then Enter, D8 will catch up to D5 and will stay caught up. If you change D3 to 12, for example, both D5 and D8 will show 120. I have no clue as to why sometimes you get a lag or why simply by hitting F2 and then Enter you can change the way the formula behaves.

Fric Marcus Woodmere, New York

I don't either. And, in fact, when I tried this it didn't work exactly the way Mr. Marcus said it would, though I got strange enough results. To give the @@ function a simpler test, I added the values in cells <=== +C3\*18 --- 60(@CHAR(@CELL("col", ICS)+64)&@STRING(@CELL("row", ICS),8)) <--- 66(E3)

Figure 1: A worksheet demonstrating a quirk in the 1-2-3 @@ function.

C11 and E3. This makes for a convention-LIMITING VALID DATA ENTRY al use of @@: C11 refers to a cell address The macro shown in Figure 2 takes comlabel in E3, which is C5. Thus C11 should plete control of data entry. You'd use it

when you wanted to limit the parts of the display the value in C5 just as C8 should. Copying or moving the formulas didn't spreadsheet that were available to the user, affect them. But when I changed the foras a control of the kind of data he could enmula in C5 (to +C3\*5), I got results of 0 in ter. When the macro is running, it will not both C8 and C11. That is the tip-off that allow the cursor to move out of the current something has gone wrong. Sure enough, column, nor will it allow cursor movement every time I changed C3, the results in C8 any lower than row 115. If you enter data and CII were one step behind. Also, when that passes the @code test in the eighth I "corrected" the @@ formulas with F2 line of the macro, that data is entered in the current cell. Hitting Esc ends the macro. then Enter, I permanently updated them, just as Mr. Marcus found

Note that the labels in columns A and C are range names that apply to the cells to their right. The labels in column B are not part of the macro and should be blank when you write it. In Figure 2 they indicate that the macro was exited properly with Escape, and that the last label entered was APRIL. Note that the next-to-last line in the macro, which appears to have an absolute cell address, actually contains the following formula:

+"[LET "ASCELLSOINTER("ADDRESS") A". seno 11"

If you wanted to, you could modify the

Perhaps most disturbing, however, was that when I tried the same trick in a different spreadsheet, I couldn't get the @@ formulas to lag at all. They always reflected the value they were supposed to. Another time, I got my short @@ formula to lag but not Mr. Marcus's long @@ formula. This variability makes me suspect that

some readers who try this will get a lag Some canny reader may yet write in with an explanation-I've been proven a simpleton before-but I'm just as baffled by this as Mr. Marcus is.

and others won't.

PC MAGAZINE . MARCH 31, 1987

#### ■ SPREADSHEET CLINIC



Figure 2: A macro that incorporates @code testing to limit input to certain cells only.

macro so that it allowed limited movement right or left. Also, if you wanted to enter both numbers and labels, you could include an additional test to see whether the first key pressed was a number or a label. On the basis of that test, you could branch to a {getnumber} instead of making the macro always flow through a {getlabel}. Robert Wittbrodt

Iron, Minnesota

The results of this macro are suspiciously like a feature that 1-2-3 already has: Range Input. That command allows the cursor to move only to certain designated cells for data entry. However, the @code test is something you could use to test for valid data in a way that /Range Input doesn't offer. Also, I like the use of {look}, {get}, and {let}. It all adds up to a sophisticated macro that, even with Mr. Wittbrodi's comments, will make you reach for your user manual.

#### SCREEN UPDATES AFTER (LET)

In the Spreadsheet Clinic of September 16 (Volume 5 Number 15), Mr. McLuckie points out that the partial recalculation functions, {recalc} and {recalccol}, in 1-2-3. Release 2.0. are not immediately reflected by an updated screen. He proposed the inclusion of {windowsoff} {windowson) after any use of {recalc}. This sequence redraws the screen, updating any values that have been recalculated.

Mr. McLuckie's useful solution can also be applied to another function that does not automatically update the screen: {let}. Consequently, I have written a subroutine called {refresh} that does nothing but invoke {windowsoff} {windowson} and then return. I use this handy subroutine | COPY and then delete the original. The

On an entirely different subject, I have heard many complaints about the fact that 1-2-3 can sort by no more than two key fields. Recently I had to do a five-level sort and duplicated the process we used in the old days with IBM card sorters; start with the low-order sort and repeat the process

immediately after {recalc} or {let}.

until you have sorted by all fields. If need be, you can write a macro to do the job. Anthony Woodworth Wellesley Hills, Massachusetts

It's true that {let} does not update the screen. The statement {let AI, AI + I}, for example, will take effect as soon as it is run in a macro, but A1 will not immediately show the incremented result 1-2-3 does however, display the CALC sign at the bottom of the screen to let you know something's not up to date. Curiously enough, you get the CALC message even when the recalculation mode is set to automatic-about the only time I can think of

when you'd see it in that mode. Yes, {windowsoff} {windowson} will certainly update {let}, but it's more than you need. Unlike {recalc}, just hitting Return or even moving the cursor will trigger an update. Thus, my choice for writing {let} would be {let A1, A1+1} . That final tilde is all it takes to get an update.

#### **OUICK MOVES IN FRAMEWORK** In Framework II, it's actually quicker to

use the COPY command when you want to MOVE something. MOVE takes forever to transfer data from one part of a spreadsheet to another. By comparison, COPY is almost instantaneous. Therefore, in order to move the contents of even one cell, I use

difference in speed is even more noticeable in large spreadsheets.

Of course, you have to be careful when you COPY formulas. Unless the cell references are absolute, they will be different after the move, and leave you in a mess. Text, of course, is easy to COPY because it never changes.

> Donald F. Pooley Vancouver, British Columbia Canada

#### PROTECTING FILES

Most people who use 1-2-3 save their updated work every so often by using the command sequence /File Save < Enter> r. The <Enter> is in response to 1-2-3's display of the name that the file was last saved under as the name under which 1-2-3 proposes to save it again. The r is for "replace" and tells 1-2-3 to go ahead and write over what is currently on disk,

Many people use this sequence so often that it becomes second nature, but it can trip you up. If you have started a brandnew worksheet instead of reading one in from disk, it has no name. Consequently, if you use the same /File Save <Enter> r sequence, you won't update an earlier version of the file; you'll mistakenly write over the first 1-2-3 file from the current directory that is displayed in the control panel. You'll also find that you've given your new worksheet the same name as the worksheet you just destroyed.

I have found a way to eliminate that problem. 1-2-3 displays files in the control panel in alphabetical order, with numbers coming before letters. Therefore, I created an empty worksheet, named it 0, and used the DOS 3.1 ATTRIB program to make it a read-only file. (You could use a commer-

#### ■ SPREADSHEET CLINIC

cial file utility to do the same thing.) I keep this file along with other worksheets in my 1-2-3 directory, and it always appears first in a control panel display of files. Now if you save a fresh spreadsheet with that name, you'll get a "Cannot create file" error message. That is a reminder to save the file under a name of its own.

This safety measure is especially useful in an office where many people—some of them beginners—use the same computer.

Satish lasti

Redford, Michigan

Even if you don't have a way to turn the worksheet named 0 hino a read-only file, just having it in your directory will give you some measure of protection. Should you write over it by mistake, you'll soon find that you have named your new worksheet 0, which is probably not what you had in mind. At that point, you could give it a proper pain.

I try to avoid the problem by always saving a new worksheet under a unique name before I actually begin building the model.

#### MORE FONTS FOR 1-2-3

At first glance it looks as though the fonts that come with 1-2-3, Release 2.0, are much the same as those that came with Release 1A. On closer inspection, however, the newer characters prove to be smaller. If you find, as I sometimes do, that these new fonts are too small to be read clearly, you can still use the old 1A fonts with the 2.0 printerarab program.

The old fonts have the extension .FON, while the new ones have the extension .FNT. This doesn't mean they're incompatible. If you rename them to .FNT, they work fine. I copied the old fonts to my hard disk with the command

copy a:\*.fon c:\lotus\??????a.fnt

This command gave all the old fonts the right extension and added an A to the end of the font names. The old fonts now show up on the font list when I run the printgraph program, and the A tells me that they are from Release IA. I use both sets of fonts, but I generally find the old ones more to

Jeff Rivett London, Ontario Canada

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| PFS 1st Choice89                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Q & A259                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Q & A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Outck Papart 145                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Quick Report 145<br>R Base System V 349                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Reflex 99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Reflex 99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Reflex 99                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Reflex 99 Revelation 575 Squeeze 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Reflex 99 Revelation 575 Squeeze 65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Reflex     99       Revelation     575       Squeeze     65       Super Calc IV     269       Symphony 1.2     439                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Reflex     99       Revelation     575       Squeeze     65       Super Calc IV     269       Symphony 1.2     439                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Reflex     99       Revelation     575       Squeeze     65       Super Calc IV     269       Symphony 1.2     439                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Reflex         99           Revelation         575           Squeeze         65           Super Calc IV         269           Symphony 1 2         439           Turbo Lightning         89           Turbo Proloque         59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Reflex         99           Revelation         575           Squeeze         65           Super Calc IV         269           Symphony 1 2         439           Turbo Lightning         89           Turbo Proloque         59           Volkswarter II         149                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Reflex         99           Revelation         575           Squeeze         65           Super Calc IV         269           Symphony 1 2         439           Turbo Lightning         89           Turbo Proloque         59           Volkswarter II         149                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Reflex         99           Revelation         575           Squeeze         65           Super Calc IV         269           Symphony 1 2         439           Turbo Lightning         89           Turbo Proloque         59           Volkswarter II         149                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Reflex         99           Revelation         575           Squeeze         65           Super Calc IV         269           Symphony 1 2         439           Turbo Lightning         89           Turbo Proloque         59                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| Segale 37mb w/conft ST238. 4 Segale 40 mb for AT ST4051 Head Drive Partitioning Schware 10.10 mb w/card 10 + 10 mb w/car | 2!<br>50                   |
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| Hard Drive Partitioning Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2!<br>50                   |
| Hard Drive Partitioning Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2!<br>50                   |
| Hard Drive Partitioning Software                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 2!<br>50                   |
| 10 mb w/card 13 10 + 10 w/card 19 20 + 20 w/card 24 BERNOULLI PLUS 37 SYSGEN Durapack single dual external/internal 1650/13 Mountain 20 mb drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2!<br>50                   |
| 10 mb w/card 13 10 + 10 w/card 19 20 + 20 w/card 24 BERNOULLI PLUS 37 SYSGEN Durapack single dual external/internal 1650/13 Mountain 20 mb drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2!<br>50                   |
| 20 + 20 w/card 24 BERNOULLI PLUS 37 SYSGEN Durapack single dual external/internal 1650/13 Mountain 20 mb drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2!<br>50                   |
| 20 + 20 w/card 24 BERNOULLI PLUS 37 SYSGEN Durapack single 4 dual external/internal 1650/13 Mountain 20 mh drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2!<br>50                   |
| SYSGEN Durapack single 8 dual external/internal 1650/13 Mountain 20 mb drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 51<br>91<br>91<br>41<br>51 |
| SYSGEN Durapack single 8 dual external/internal 1650/13 Mountain 20 mb drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 9:                         |
| Mountain 20 mb drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 9:                         |
| Mountain 20 mb drive card 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 9:<br>4:<br>4:<br>5:       |
| Mountain 20 mb drive card 6 Western Digi. 30 mb drive card 6 Western Digi. drive card 20 mb 6 Plus Hard Card 10 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 49                         |
| Western Digi. 30 mb drive card 6<br>Western Digi. drive card 20 mb 6<br>Plus Hard Card 10 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 49<br>21<br>59             |
| Western Digi. drive card 20 mb. 6<br>Plus Hard Card 10 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 59                         |
| Plus Hard Card 104                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 59                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |
| Priam 60 mb AT 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2                          |
| Priam 43 mh AT 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | e.                         |
| GAMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | *                          |
| GAMES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            |
| Baron/Millionaire \$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3                          |
| Baron's SAT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4                          |
| Flight Simulator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3                          |
| Jet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |
| NFL Challenge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 8                          |
| Sargon III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 31                         |
| Zork I II III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3                          |
| MONITORS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                            |
| AMDEK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            |
| AMDEK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            |
| 310-A \$1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 41                         |
| Color 600 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                            |
| 310-A \$1<br>Color 600 4<br>Color 722 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                            |
| PRINCETON PRINCETON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7                          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ī,                         |
| MAX121                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2                          |
| HX12 4<br>HX12E 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |
| HX12E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 9                          |
| TAXAN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                            |
| 840                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 9                          |
| 720                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7                          |
| 635 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Šİ                         |
| 650                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | i                          |
| SONY Multi Scan 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                            |
| NEC Multisync 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 74                         |

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| LQ 1000 180 CPS, 60 NLQ                                                                                                                                                      | 63          |
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| SPECIAL PRICINGPRIMAGE 90                                                                                                                                                    | CALI        |
| w/Pagemate III                                                                                                                                                               |             |
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| Genoa Galaxy 20 mb Int/ext                                                                                                                                                   | 589 69      |
| Sysgen Quic 60 Int/ext                                                                                                                                                       | 949/99      |
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| Tallgrass 20 mb internal tape                                                                                                                                                |             |
|                                                                                                                                                                              |             |

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> Jim Pitre, President

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# CONNECTIVITY CLINIC



Our newest department begins with answers to the questions most frequently asked by connectivity product users, as posed by networking manufacturers.

This issue begins Connectivity Clinic, in which contributing editor Frank J. Derfler, Jr., answers your tough questions about communications. In the spirit of PC Magazine's ongoing commitment to hands-on solutions to your computing problems, it tackles what really works and what doesn't. The format, like that of PC Advisor and PC Tutor, is question-and-answer. Feel free to submit your questions on local area networking, microto-mainframe communications, PBX applications, and long-distance digital communications. Send your inquiries to Connectivity Clinic, PC Magazine, One Park Avenue, New York, NY 10016.

#### WHO NEEDS NETBIOS?

I am writing specifications for a local area network to be used in our school. Some LAN companies advertise that their products are NETBIOS compatible. What is NETBIOS and what does it get for us?

NETBIOS is a program that integrates the hardware on a specific manufacturer's network interface cards with networking splware and networked applications. Sytek and IBM developed the firm' 'sstardard' verston of NETBIOS. IBM' STEBIOS. THE BIOS itse the Sytek network interface boards (used by BMI ints PC Network) the IBM Token-Ring Network interface boards to IBM's PC Network Program or its successor, IBM's PC Local Area Network Program.

Technically, NETBIOS does four jobs for a network. First, it provides point-topoint communications. Network stations are connected with a point-se-point comnection called a virtual circuit. This is useful for sharing disk drives and princers anong workstations and for functions such as electronic mail. Second, NETBIOS estage track of the anne given to each user on the network. Third, NETBIOS establishes assiston between users over the onwork. The exchange of data in a session is work. The exchange of data in a session is a packet known as a datageran and transnit is out to the network. Acknowledgment and retransmission of datagrams are the responsibility of higher-level software responsibility of higher-level software

such as the networking program, Not many of the network applications programs currently on the market actually make full use of NETBIOS, but many programs modified or written for NETBIOS are promised "isoon."

Network companies have scrambled to create NETBIOS programs able to present

 NETBIOS is a program that integrates the hardware on network interface cards with

networking software and networked applications. the same face to the networking software as the Sytek/IBM products. They have had mixed success. Companies as big as AT&T and Ungermann-Bass have had to tweak and twiddle with their NETBIOS programs to make them compatible.

#### LAN OR MINI?

This may sound like a dumb question, but I am not sure that I understand the difference between a LAN and a minicomputer with a lot of terminals.

This question isn't dumb; in fact, it is the one most commonly asked in the seminars we teach. The line between a minicomputer and a LAN is theoretically very clear, but in practice it gets more blurred with every passing product amouncement.

With a minicomputer, all applications program execution and storage is centralized. A minicomputer executes the applications program in its own processor and RAM. The minicomputer sends data to the terminals and accepts keyboard input from the terminals.

In a PC-based LN, the applications programs are centrally stored on the server, but they are executed in the processor and RAM of the local workstation. The server runs programs, but they are associated with file sharing, security, and other special network functions. Some servers now run network amplica-

tions such as electronic mail and communications gateways, in which the servers treat the workstations very much like a minicomputer treats its terminals. Some minicomputer systems now have very

#### CONNECTIVITY CLINIC

smart terminals able to do a lot of local processing of data before and after the data hits the applications program in the

Formerly, workstations on a PC-based

LAN always had some local disk-storage capability. Now Novell, Santa Clara Systems, and several other companies are marketing diskless workstations that still execute the program locally but rely totally

on the network server for storage.

Alloy, Advanced Digital, and Kimtron, among others, market systems with multiple processor and RAM cards in a single central cabinet with disk storage. Each processor is dedicated to a remote terminal. I consider these products to be LANs with very short connections between workstations and very long keyboard and monitor cables.

#### THE UPGRADE PATH

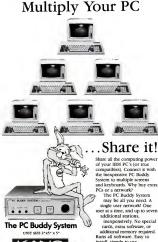
We are considering upgrading six standard PCs in our office with hard disk drives. Would we get improved performance or have significant cost savings by connecting the PCs to an existing AT through a local area network?

If "performance" means simply how fast you can load a file from disk, then adding local hard disks is probably the best choice. It's simpler and cheaper. Howev-

 Inexpensive network cards, such as those being offered by Western Digital, are just around the corner.

er, inexpensive network cards, such as those being offered by Western Digital. are just around the corner.

Your decision really involves more than performance and price. Do you put any value on the ability to easily exchange files or to share a printer? Is electronic mail or a common office calendar worth anything to you? If all you want is fast disk service. then the scales tip toward individual hard disk drives. But if these other factors have value for you, it doesn't take much to move the balance toward installing a LAN. Be warned however, that your existing PC AT may not be the ideal LAN server. It's fast enough by itself but doesn't have all that much speed to provide fast, efficient file and printer sharing among half a dozen office users.



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If you own two or more PCs then you need EasyL4N = version 3.0.

#### THE EasuLAN OFFICE NETWORK

EasyLAN shares printers and disk drives between IBM PCs. EasyL4N can save you \$1,000 or more per PC by eliminating duplicate equipment purchases And now, you can run NETBIOS supported applications. Or you can write your own network

#### applications for EasyLAV and other NETBIOS com patible networks EasyLAN VERSION 3.0 HIGHLIGHTS

- EasyLAN shares printers, plotters, data, and disk storage
- Supports up to 18 PCs or compatibles New Network Commands
- New NETBIOS PC to PC file transfer
- Print spooling
- PBX support Easy to install
- Easy to operate Performs in the background

EasyLAN's low price matches the small business user's cost-sensitive budget. It is the office network solu-

tion for less than \$100 per PC. EasyLAN performs its operations concurrently in the background, EasyLAN communications, file transfers and printer operations all take place while each PC simultaneously performs such normal DOS applications as Lotus 1-2-3," Wordstar," and dBASE."

#### NEW NETBIOS SUPPORT-WRITE YOUR OWN COMMUNICATIONS PROGRAMS.

cations can now be operated across the low cost RS 212 communications links used by EssyLAV Our new EuroCALENDAR program is an example of a network application that uses NETBIOS for program to program

Multi-user data-base management applications that perform faster on high-cost networks operating at mega-

#### NEW VERSION 3.0 COMMANDS EXPAND NETWORK FLEXIBILITY

EZCLOCK lets PC's attached to the network read the time and date from a single master clock on the central PC, liminating the need to install individual clock boards in each PC and insuring that all file entries and updates made across the network are dated

The EZ Make Directory and EZ Remove Directory com mands function identically to the DOS MKDIR and RMDIR commands, and give remote users increased flexibility

when it comes to managing subdirectories on the central EZBEEP lets you send an audible surnal across the network, alerting a PC user that a file or message is being.

EnsulAN PRX SUPPORT BRINGS NEW

#### FLEXIBILITY TO PC CONNECTIVITY With Easyl-AV's PBX support, users can share peopler

ready been installed on a number of different PBX's, and

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Disk sharing uses EusyLAV's EZCOPY com mand to move files to and from PC's. ASCII or binary files can be transferred in the foreground, or in the

background while other DOS programs run Printer sharing operates transparently with existing programs. Print files are automatically spooled to disk and scheduled for printing. Multiple printers on the central PC may be designated for



EasyLAN Office Network

#### EasyL4N SPECIFICATIONS Each PC in the network requires an individual li-

individual printing tasks.

censed copy of the EasyLAN program and takes 20k of memory on each satellite PC, a serial port, and DOS 2.0 or above. EasyLAN runs on all IBM PC models and compatibles. The central PC requires port for each satellite PC. The COM2 and boards are serial port expansion boards wh mit you to add serial ports to the central PC

EASY TO INSTALL

EasyLAN can be installed in less time than it takes to enjoy your coffee break. Just plug the EasyLAN cables into existing serial ports. The EasyLAN Network Configuration Program provides menu driven installation program that will guide you step by step through the software installation process.

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I bought access to a laser jet printer for less than

| and compatibles. The central PC requires a serial port for each satellite PC. The COM2 and COM6 boards are serial port expansion boards which permit you to add serial ports to the central PC. |       | V-                                                                   | -c         | ONOC | 0 Oil User |
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## POWER USER



Cross-file operations in WordPerfect, concatenating dBASE macros, WordStar strokes for WordPerfect folks, solidifying lines in Microsoft Word, bolder dBASE report headings.

#### AN S/R WORDPERFECT MACRO

How about a multiple-file global searchand-replace operation in WordPerfect? I developed this macro when I changed modem specs (ports and speeds) for about the fifth time and decided that a simple findand-replace macro, used on one file at a time, wasn't a very efficient way to change 20 command files for Crosstalk,

The macro Change works from a blank document, with the List Files directory (<F5>=) set to the directory containing the files to be modified.

For changing WordPerfect documents. the macro is shown in Figure 1. The last lines shown indicate the changes needed for working on non-WordPerfect text files. e.g., Crosstalk .XTK files.

Note that while quotation marks should not be used with the find-and-replace strings in the Replace function (unless they are actually part of the subject or new text), they are required with the List Files Word Search function if the string contains more than one word or you are using pattern matching with \* or ?.

This macro, most useful when you have the WordPerfect Library Macro Editor, lets you key the whole thing in only once and then edit just the text strings.

Anthony W. Rairden Wilmington, Delaware

What makes this work is WordPerfect's ability to read through the files and list only those that contain the selected text to be changed. Since few word processors have this feature, there are few that can applies equally well to external macro programs such as ProKey, SuperKey, and SmartKey, all of which will let you edit the macro at will .- M. David Stone

#### LINE GRAPHICS WITH WORD Microsoft Word doesn't print all the line

graphic symbols in IBM's extended character set. Word uses ASCII symbol 196 (the horizontal line symbol used in almost all line graphics) for its nonbreaking hyphen symbol. So that you are not left without a horizontal line symbol when you print, Word substitutes ASCII 45 for AS-CII 196. This makes straight horizontal lines print as a series of dashes that don't match up with any of the mating line graphic symbols. Fortunately, power users

Word's printer drivers (PRDs) let you map any printed symbol into any other symbol, Start by using the MAKEPRD EXE utility to convert the .PRD file into a text file. (Documentation for MAKE-PRD is in the Printer Information manual that comes with Word.) Then use Word

both to load the text file and modify it. Each font description in the printer file

has a Character Translation Pointer (CTP). If the CTP reads CTP:Tn, n is the number of the CTT to be modified. Simply add the line 196: "-" to the CTT. If the CTP reads CTP:NIL, then there is no CTT for that font. In this case, create a CTT section that

cCSD:1 chFirst:196 chLast:196

looks like this:

(See the Printer Information manual for details on where the CTT goes within the printer file.)

In either case, the symbol between quotation marks is the symbol that prints when Alt-196 on the numeric keypad is pressed. And in either case, the line 196:"-" re-

maps ASCII 196 so that it prints the symbol for ASCII 196 instead of printing the symbol for ASCII 45. Complete the job by converting the

modified PRD back to binary with MAKEPRD. You might want to rename

F5 filespec (Enter)

have a neat way out.

"Final Property of the Control of th

Note: for operating on non-MordPerfect text files the last two lines of the

necro become:

CDOWN-errow> 5 Alt-F2 n "text to be changed" F2 "new text" F2
Ctrl-F5 1 <CR> y F7 n n Alt-F10 Change <CR>

adapt the macro. Rairden's last comment | Figure 1: A WordPerfect macro that performs multiple-file global search-and-replace operations

#### ■ POWER USER

the PRD to remind you that it's modified. Load the modified PRD into Word with the Print Options printer command, and you're ready to print far better graphics than before. Be aware that some printers emulate the IBM extended character set by a different method. The above procedure may not work for them.

Bill Kraengel, Jr. Valley Stream, New York

The really nice part of this fix is that nonbreak hyphens, as in 1-2-3, still look like hyphens at the printer.—M. David Stone

#### WP FILE-HANDLING FEATURE

A very useful feature of WordPerfect 4.1, not documented in the user's manual (although explained in the Help feature), allows you to do multiple/mass copying, deleting, or printing while displaying the directory file list (List Files).

You mark the files you want to copy, delete, or print by pressing the asterisk (\*) delete, or print by pressing the asterisk (\*) invoking the Mark Text (Alt-F6) function, you can mark all fles in the directory list. [In my copy of WordPerfert 4.1, the key is Alt-F5.—Ed.] Once the files are marked, you can select the permitted option by number from the menu.

Tom Dunnigan Jeffersonville, Indiana

Aside from the obvious uses of this feature—copying selected files to a different subdirectory or disk or printing several chapters of a manuscript-there is at least one other way to squeeze some use out of marked files. The Word Search option of the List Files menu allows you to search all documents in your file list for specific text strings, after which only the files containing the string(s) are displayed. Simply marking all files by depressing Alt-F5 before the search will present you, after the search, with a complete directory listing in which an asterisk marks each file that contains the string. You could then perform mass copy, delete, or print operations on the marked files. You might find other uses for this little gem, as well.-Mitt Jones

#### SPEEDING UP WORDPERFECT

That tired workhorse, WordStar, eats WordPerfect's dust at most tasks, yet in actual use it is by far the faster editor. In WordPerfert, every milor cell requires a sequence of ineflicient actions: lift your right hand, move it to the number pad, oct, then return to the keyboard and locate the correct finger position. In WordSur, you can cell without ever iffing a street in principle of the property of the pr

If you build a table of keyboard macros, however, you cause WordSuss's more efficient keystrokes to give commands in WordBerfers. Since WordBerfers's sown macros are limited to Alt-key rather than Crit-key combinations and would use up a lot of macro possibilities you might want for other purposes, a better choice would be an external macro handler like Super-town of the word 
Building a nearly full complement of WordStar key definitions in Super-Key takes only about 5 minutes. You can't takes only about 5 minutes. You can't clone WordStar's two-character commands (like Ctrl-KB) because Super-Key doesn't allow two-key marcns. But Word-Perfect wisely assigns most of those commands to the function keys anyway, and exceptions can be assigned to a single key, such as Ctrl-O.

When you're finished defining the Ctrlkey macros, save them as a file with a descriptive filename, such as "WSKEYS." Then the line

KEY WSKEYS /ML

added to your AUTOEXEC.BAT file will load SuperKey and immediately activate the WordStar macros whenever you turn on the computer.

George R. Beinhorn Atherton, California

I've been using this trick for some time, but with ProKey rather than SuperKey, and with Microsoft Word as well as with WordPerfect.

The word processing world seems to be

The word processing world seems to be divided into those who like using arrow keys and those who don't like taking their hands from the keyboard. Redefining the

keyboard makes programs like Word and WordPerfect far more palatable for thase of us in the second category.

For thase who are unfamiliar with the WordStar diamond, it's worth pointing out that the WordStar cursor control keys are not only easier to get to than the arrow keys, but are also easy to remember. The E. X. S. and D lie on the four points of a compass, and each moves the cursor in the direction indicated by its relative layout: up, down, left, or right. [For some of us this is not easy to remember: it is not only antimnemonic but adds a layer of cognitive dissonance for the touch typist. (Try to type the X in Ctrl-X with your ring finger.) However, as Stone notes, there are different strokes for different folks .- Ed. 1 Notice, too, that one key over from S (left a letter) is A (left a word) and one key over from D (right a letter) is F (right a word). Anyone can quickly learn these six keys. Other WordStar commands that are equally useful, but harder to learn, include Ctrl-G for Get rid of one character, and Ctrl-T for Take away one word.

Not so incidentally. WordPerfect users should be aware that programs like Super-Key and ProKey have at least one additional advantage over the WordPerfect macros besides letting you define Ctrl-key combinations. Both of these programs create macro files as text files. These can then be easily edited without needing the Word-

Perfect Library. Finally, the line for automatically loading the macro program is best placed in a batch file that calls up the word processor rather than in the AUTOEACE BAT file. Otherwise, the WordStax macros may interfere with Ctrl-key commands in other programs.—M. David Stone

#### PAUSE PLUS

Debbie Cucci's pause routine (Volume 5 Number 20) for dth.95 a poljcations is very useful, as you suggest. However, different messages require different amounts of attention. Moreover, because different processors run at different speeds, a delay routine based on the execution time of a DO LOOP is not very portable: a satisfactory delay for a PC running at 4.77 MHz will be almost halved by a 6-MHz AT. comoile and run it on a Compasa 386, and

you may not even see the message!

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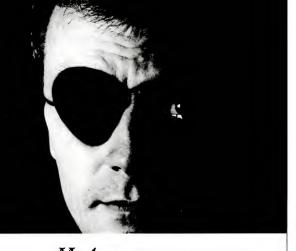
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#### POWER USER

\*\*\* PAUSE. PRG pana ness, du 22 CHR(7) SET CONS OFF mess=CHR(26)+" "+mess+" "+CHR(27) 24, (SP-LEN(mess))/2 GET mess CLEA GETS ntl=# DO WWIL cntl<dur time=TIME() WHIL time-TIME () 24.0

Figure 2: A dBASE III procedure to display temporary messages of variable duration.

SET CONS ON

One solution is to use the system clock for the timing of delays. The enhanced routine above (Figure 2) passes two parameters: the message and the desired du-

ration in seconds. For example, DO pause WITH message, 3

The message will be displayed for 3 seconds in this case. By using the system clock, we have time on our side.

Robert J. Borter, Jr. Ocala, Florida

Judging from the number of responses to the original PAUSE.PRG, a lot of programmers have need for such a procedure. and Mr. Borter has added a useful time parameter.

Unfortunately, dBASE reads the system clock only in whole seconds. Depending on where you land in the cycle, a "Isecond" pause could be as short as .01 seconds or as long as 1.99. Hence, Mr. Borter's routine will be a little unpredictable if 1-second displays are passed.

By contrast, Nantucket's Clipper compiler offers a SECONDS() function accurate to 1/100 of a second-just like the DOS system clock. Perhaps future releases of dBASE will, too .- Brad Stark

#### ENHANCING dBASE REPORTS

In a long dBASE report, Group and Sub-Group headings don't stand out at all-they seem to get lost in the body of the report. I recently discovered a neat little trick: you can embed printer control characters right in the dBASE .FRM file to make your headings as bold and brassy as you please.

For example, suppose you are produc-



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#### ■ POWER USER

ing a report sorted by State and then by City, and you are using these as Group and Sub-Group fields on page 2 of the dBASE III Report Form Generator, Normally, you would enter the field names. State and City, as the Group and Sub-Group expressions, and the character strings, STATE and CITY, as the Group and Sub-Group headings.

Assume further that CHR(14) turns on doublewide printing for one line, that CHR(27)-CHR(69) turns on emphasized printing, and that CHR(27)+CHR(70) cancels emphasized printing. To make your Group information print doublewide, just enter the following as the Group expression:

#### CHR(14)+"STATE: "+State

Note that the Group heading ("STATE:") is incorporated as a character string within the Group expression, and both will print doublewide.

To emphasize the Sub-Group similarly, enter this as the Sub-Group expression:

CRR(27)+OR(49)+\*\*CETY: \*\*CETY+OR(27)+OR(78)

In this case, the escape sequence, CHR(27)+CHR(70), is required to cancel emphasized printing—otherwise it will continue throughout the proof.

dBASE's .FRM file can be used in this way to send any other printer control characters and escape sequences you like; just remember to cancel them each time.

The main Title and Column headings are more difficult because dBASE treats these strictly as character strings. The Alt key plus numeric keypad combination seems to work. I tried the ASCI characters from 1 to 32 without success, but when 1 added 128 to the desired ASCI number 1 found that the 128–160 range produced the desired ASCII.

Chris Brown Jacksonville, Florida dBASE's report generator is rather limited, but Mr. Brown's creative idea squeezes at least a little blood from the

sione. Here are a few more suggestions. Group and Sub-Group headings will stand out even more if you insert a carriage return. CHRIS-1+CHRI(10), at the end of the Group and/or sub-Group reseasor. You can whether the bendings either by using except sequences or by inserting a carriage return followed by a consequence of the continuation of the c

To make your Group and Sub-Group expressions more readable to yourself, you may prefer to initialize some memory variables and use these instead of the actual escape sequences. For example.

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#### Then, for your Group expression, enter uline+"STATE: "+State

instead of

CHR(27)+CHR(45)+CHR(1)+\*STATh: \*+State

In some coses, you might wout to enhouse the contents of a whole column, though this will slow your printer's output considerobly. Again, you'll have to experiment to get the desired result.

I was not able to duplicate Mr. Brown's success in enhoncing the main Title and Column heodings by using the Alt key plus numeric keypad combination. However, since dBASE's HEADing option does transmit escope sequences, you might substitute o HEADing in ploce of the regular Title. Another work-around to enhance the main Title takes advantage of the foct that in printing the report, the optional HEADing olways precedes the moin Title and the Group heading always follows it. Thus, for example, you could use the HEADing to transmit the main Title's sequence, then stort the Group expression with the cancelling sequence.—Brad Stark

#### DOUBLE MACRO FUNCTION

While the dBASE macro substitution function (the "&" symbol) is very useful in itself for shortening code, you can get even more mileage from it by concatenating two

macros. For example: raquame PC Fécazine

This powerful capability allows greater flexibility in array simulation and field selection routines. Since working with the function in this manner. Lalways keep it in mind when namine fields for any new database systems.

Chris Brown Jacksonville, Florida I had to see these lines work to believe it. In simulated arroys or other complex routines it lets you replace whole blocks of commands with a little DO WHILe loop, (But the code for double mocros will make tough reading 6 months later.) Power users will find this technique as slick as goose greose, and dBASE II, Version I of dBASE III, oud dBASE III Plus oll occept both the double macro and even the &o. &b syntax --- Brad Stark

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# User-to-user



A powerful DOS MID\$ filter, two improvements for FIND wildcard searches, file linenumbering tips, and a simple technique for scanning text files quickly on-screen.

# SUPER DOS STRING HANDLER MIDS.COM is a filter that imitates the BASIC command of the same name. The format is

MIDS n.m

where n and m are decimal numbers in the range 1 to 255. The filter returns with a string of length m characters starting at an offset of n characters from the start of the string. If n is omitted, MIDS defaults to the start of the string. If m is omitted, all rightmost characters starting from n are returned.

Be sure to leave only one space between MID\$ and the first argument. MID\$ is not smart enough to scan off leading spaces, but then it is short, fast, and effective.

Like the other DOS filters. SORT and FIND, MIDS is designed to work in combination with the other DOS commands, especially the piping and redirection features. However, you can enter MIDS by itself at the prompt for a quick demonstration of how it works. Enter

MID\$ 5,3

1234567890

To create MIDS.COM, run the MIDS. BAS program in Figure 1, or use a pure ASCII word processor or the DOS COPY CON command to type in the MIDS.SCR in Figure 2, then get into DOS, put MIDS.SCR in the same directory as DE-BUG.COM, and type

DEBUG < MIDS.SCR

```
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         DX.155
         CX, PEGG
AB, 3F
                        Read up to 65824 bytea
HOV
HOV
INT
HOV
CHP
JZ
HOV
CAL
ADD
CHP
JZ
DEC
                                   :Bytea read
         BYTE PTR [88],8
                                   ; Ar gumenta?
                       ; If no, write all
; Elae point to arguments
; Convert to hex
         SI,82
         DX.BX
                        Add to offaet
         BX,8
                       ; Is it mero?
; If no, don't adjust
         DX
                        Else, sub 1 from offact
                      (SI-1],28 (Another argument?
JBE
                                    ; If no, write
                        Else, convert to hex
                                                                                 (continues)
```

Figure 2: MIDS. SCR. script to rease MIDS. COM DOS string filter. Use a pure ASCII word processor or the DOS COPY CON command to ope thin in, then get into DOS, and MIDS. SCR in the same direview; an DEB/GC COM, and type DEB/GC AMIDS. SCR. Don't type the comments of the script of t

MIDS. COM

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USER-TO-USER

Bytea to write Standard output device CX,BX HOV BX,1 AH,48 MOV :Write atring INT INT 20 :Terminate XOR LODS BX,BX ;Subroutine: decimal to hex ;Get a byte ;Ie it a comma? ;If yea, return AL,2C 158 AL,38 CHP JBE ;Elee, eub 38h ;Store in BP ;Multiply hy 18 BP, AX AL, A BL, AL store in Rt. AX,BP BL,AL Retrieve no. Accumulate ;Get next no. Return RCX 51

When you create MID\$.SCR, don't type in the comments to the right of the semicolons, or the semicolons themselves. Hit the Enter key at the end of each line (especially the last one with the O) and be sure to leave a blank line above the RCX

Michael J. Mefford Gleneden Beach, Oregon

This is truly a powerful and long-awaited utility. You can use it to clean up irritating, long-winded DOS messages, and do all sorts of DOS magic.

For instance, if you've ever wanted to use the DOS clock to time an event, you have to either set it to zero and then reset it manually, or show the starting time and ending time and ask the user to subtract one from the other, But not with MID\$ COM.

To try this, create three files: CR. ZERO, and TIMER.BAT.

CR is simply a carriage return. Type CON CON CR

and hit the Enter key twice, then hit the F6 key (or hold down Ctrl and hit Z) and then the Enter key a third time.

ZERO is not much bigger than the CR file. Type

COPY CON ZERO

0:0

and hit the Enter key again, then hit F6 and then the Enter key a third time. TIMER BAT is a hit longer: PC MAGAZINE . MARCH 31, 1987

echo off time < cr | find \*C\* | mid\$ 18 > holder echo The time ie now type holder type cr opy holder+cr holder > nul time < zero > nul echo Nait e few eeconde then hit e key pauce > nul echo You paused for time < cr | find "C" | mid\$ 18 time < cr | find "C" | mid\$ implements type cr echo seconde ... echo Now recetting the time to... type holder time < holder > nul del holder

(Figure 2 ends)

MIDS.COM is wonderful. You'll find dozens of uses for it every day.

#### SWITCHED-ON FIND

A recent PC Lab Notes column on advanced FIND techniques (Volume 5 Number 20) explained a method of using the DOS FOR...IN...DO command to handle FIND wildcards. While this was an excel-

## MID \$ COM can

clean up irritating

and long-winded DOS messages, and do all sorts of DOS magic.

lent suggestion that I now use regularly, I've found two ways to improve this batch procedure.

#### ■ USER-TO-USER

The Lab Notes procedure lacked a method for specifying different combinations of wildcards (such as \*.PAS), and couldn't add FIND switches such as /C or /V. The WILDFILE BAT batch file below allows both of these.

ECHO OFF IF \$21--1 GOTO ERROR FOR \$\$A IN (\$2) DO FIND\$3 "\$1" \$\$A

GOTO END :EMPOR ECHO The proper command syntax is: ECHO WILDFIND string filename [switches]

The WILDFIND syntax is slightly different from the DOS FIND syntax. First, the string to search for is not enclosed in quotation marks. Second, the optional switches go at the end of the command line instead of immediately after the command name. As with DOS, switches are separated from the filename by at least one space.

For example, to hunt for the string VARI in all files with the extension PAS, and then count but not display each occurrence of the string, type

WILDFIND VAR1 \*.PAS /C

Gary Later
Buellton, California

FIND and the FOR...IN...DO command are two of the most powerful DOS commands, especially when joined together. Unfortunately, each has drawbacks. An annoying one is the awful IN numbering

# ■ FIND and the FOR . . . IN . . . DO command are two of the most powerful DOS commands, especially when joined.

system. If you wanted a cleanly numbered list of all the \*.TXT files on your disk, you might think you could type

DIR \*.TXT | FIND /N \* \* > NUMLIST

However, FIND won't put spaces between the numbers and the actual entries. and it won't align the columns properly if you're going from single-digit to doubledigit numbers (or double to triple, if you have lots of files).

Worse, since the IN switch is really designed for searching through program source code, or phone directories, and not redirected DOS outputs, it will choke on empty lines and end up misnumbering everything. A better way might be to get into DOS and redirect a directory of text files into a file called IN

DIR \*.TXT | FIND n=n > IN

and then run a small BASIC program
NIIMBER BAS

188 OPEN "IN" FOR INPUT AS \$1 118 OPEN "OUT" FOR OUTPUT AS \$2 128 WHILE NOT EOF(1) 138 LINE INPUT \$1,A\$

140 PRINT #2,USING \*\*\*\*;A+1; 150 PRINT #2,CHR\$(32);A\$ 160 A=A+1:WEND:CLOSE

Another irksome thing about FIND is the "...." line it prints when displaying anything. This is easy to get rid of by going into the code with DEBUG and replacing each hyphen with a backspace. First, rename FIND-EXE to F, and

First, rename FIND.i
load DEBUG:

REN FIND.EXE F

When you see the DEBUG "-" hyphen prompt, type RCX and hit the Enter key twice. DEBUG will respond with something like

CX 19Ø3

Then, when you see the hyphen prompt again, type

S 100 L1903 "-----"

(substituting the actual hex number DEBUG reported after the CX in the previous
command, if it's different from 1903), DEBUG will print an address that looks
something like

2F71:19F7

Ignore the first four numbers (the ones to the left of the colon). Take the four rightmost hex numbers and enter them in place of the xxxx below:

E xxxx 8 8 8 8 8 8 8 8 8 8

For instance, you'd enter E 19F7 88888 8 8 8 8 8 8 8 if DEBUG returned the 2F71:19F7 mentioned earlier. Then type

REN F FIND.EXE

(hitting the Enter key after each line) and your new, patched FIND won't ever print the -----line again when displaying the strings you've searched for.

FAST FILE SCANNER
I often look at disks with lots of .BAT files
on them, and have long wanted a way to

scan through them all without using the

 I wanted a way to scan through lots of .BAT files without using the DOS TYPE command,

which can display only one file at a time.

DOS TYPE command, which can display only one file at a time.

While leafing through the IBM DOS reference manual recently, I realized that it was possible to copy these .BAT files to the screen by using the COPY filename CON command:

COPY \*.BAT CON

But while this puts every file on-screen, along with its name, DOS won't pipe this through the MORE filter. So I tried copying all the .BAT files into one master file and then piping the master file through MORE, with

COPY \* . BAT DUMMY TYPE DUMMY 9 | MORE

This kind of quick on-screen file scan works with any text files. For example, if your disk contains a README file and one called INSTALL.BAT, you can scan

#### USER-TO-USER

# COPYII

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PC MAGAZINE - MARCH31, 1987

them both with the following command

COPY README+INSTALL, BAY CON

Deena Eliosoff Montreal, Quebec Canada

A simple way to display lots of batch files would be to create two batch files called SCANBATS.BAT and READ.BAT. First.

SCANBATS BAT

cycles through all the .BAT files on your disk. Then.

READ.BAT performs

the actual displaying.

SCANBATS.BAT cycles through all the .BAT files on your disk: ECRO OFF FOR NAF IN (\*, BAT) DO COMMAND /C READ NAF

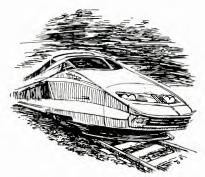
Then, READ.BAT, which is called by SCANBATS BAT, performs the actual displaying:

ECHO OFF CLS ECHO %1 TYPE %1 | MORE PAUSE

To try it, type in both batch files using a pure ASCII word processor or the DOS COPY CON command, and then type SCANBATS.

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We call this remarkable compatible the "GV" 286, and it's the very first 12MHz No-Watt-State micro available outside a research laboratory. To design a machine that operator reliably at

To design a machine that operates reliably at 12MHz with no wait states, our engineers had to come up with some major innovations. And they did.

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The cache circuit also assures high reliability, allowing the GV-256 to operate at super-high speeds without pushing its integrated circuits beyond their design limits. Other 12MH: machines put their ICs through hell to achieve high speed, and that means they be inherently less reliable.

Yet with all this speed and design innovation, PC Designs engineers—unlike other manufacturers have customized the BiOS and retained the standard IBM PC-AT bus timing (yet another PC Designs exclusive). The result is unparalleled

comparibility with existing software and peripherals. There's a boxcar load of other design features and the GV-86 can be ordered up in virtually any configuration you can imagine. Best of all, standard systems start at less than \$4000 (including Desoview multitastings software).

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# PC TUTOR



Once you understand the implications of cluster size, you can save space on your hard disk by reconfiguring it under one of the newer DOS versions.

WHY IT DOESN'T ADD UP
I have been mystified about an apparent

I have been mystified about an apparent loss of space on my IBM 20-megabyte hard disk drive. When I run CHKDSK, it reports about 21 megabytes for stotal disk space: 12 megabytes in 770 files, and 9 megabytes five. However, when I add up the sizes of all the files manually, I get a total of only about 8 megabytes. What hapened to the other 4 megabytes.

Nobody I've talked to can reconcile this difference, which to my mind seems excessive.

David P. Walsh Chesterfield, Missouri

Over the course of my PC Tutorship, I've received several letters about this problem, usually from people whose job it is to make sure that the sum of the parts is equal to the total. (Mr. Walsh is a functial consultant), Disk space doesn't twork this way. Using a disk is like going out shopping with only dollar bills and never getting any change back.

The entire data area of a hard disk is devised into modifice areas called chair areas called chair. Files on a disk are always stored in one or custers, if the file does not fill up the last cluster it occupies, then the rest of the space in that cluster it lost. The muster is lost. The number of bytes in each file reported by the DIR commad is the size of the file when it was created or last modified. The amount of space cated or last modified. The amount of space size of the file effect rounding up to the next multiple of the cluster size.

You can easily determine the cluster size for a particular disk. First, do a DIR and note the "bytes free" value. Then create a very small file. The easiest method is by issuing the command

ECHO >SMALLFIL

Now do another DIR and see how much space you've lost. That's your cluster. That's your cluster size is always a power of 2, and for most normal disks it is a multiple for most normal disks it is a multiple size of 126 or 256, but real disks size of 126 or 256, but real disks sizes of 126 or 256, but real disks sizes of 126 or 256, but real disks sizes of 126 or 256, but real disks for 126 or 256, but real disks of 126 or 256, but real disks of 126 or 256, but real disks of 126 or 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks it is a but real disks of 256, but real disks it is 256, but real disks of 256, but real disks it is 256, but real disks of 256, but real disks it is 256, but real disks of 256, but real disks it is 256, but real disks of 256, but real disks it is 256, but real disks of 256, but real disks it is 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 256, but real disks of 2

For hard disks larger than 10 megabytes, the cluster size is dependent upon the DOS version used when the disk was originally configured with FDISK and FORMAT. A 20-megabyte hard disk originally configured under DOS 2.x has a

■ Using a disk is like going shopping and never getting any change back. If the file does not fill a cluster, the rest of the space is lost. cluster size of 8192 bytes.

On average, you will probably loss book half a cluster for each file on the disk. For the 770 files you mention, this alone accounts for about 3 megabytes. If you have a lot of small files whose length is less than half a cluster in stee, this will account for more loss. In this connection, not that sudder-cories (the created awnes of the subdirectories, not the files in them on the sust and the subdirectories, the created awnes of the subdirectories, not the files in them on the summer last thing open the paper required for data files. CHKDSK reports those flurars solt.

The real culprit here is the 8192-bye cluster size. It sounds too big for most uses, and it is. It is the direct result of the method of storing files on a disk that was introduced way back in DOS 1.0. This method limited the total number of clusters on a disk to 4767 (which is 4969 minus some cluster numbers used for special purnoses)

Under DOS 3.0 and later, however, the touch and later however, the disk was increased to 65,518. This allows using a much smaller cluster size for a hard disk. A2 or 30-megabye hard disk that has been FDISKed and formatted under DOS 3.x. has a cluster size of 2048 bytes. That's more reasonable.

(With 65,518 clusters available, it is theoretically possible to have a cluster size of 512 bytes for a 20- or 30-megabyte disk, but you really don't want clusters that small. Since files may be stored in noncontiguous areas of a disk, a very small cluster size would result in files becoming highly fragmented, which would have the effect of fragmented, which would have the effect of

#### ■ PC TUTOR

# Not Sure About A Product Or Service You've Seen Here?

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slowing down file access time.)

It is interesting to note that prior to DOS 3.0 (which was introduced at the same time as the IBM PC AT), IBM did not sell a hard disk over 10 megabytes. The original PC AT had IBM's first 20-megabyte hard disk. Although it is entirely possible to install a 20- or 30-megabyte drive on a PC or XT running DOS 2.x, nobody working with strict IBM parts ever actually had a cluster size over 4096 bytes. The problem of excessively large cluster sizes was thus fixed when IBM simultaneously introduced a 20-megabyte hard disk and DOS 3. In a sense, then, it's not even IBM's problem if you have a 8192-byte cluster size.

DOWNSIZING CLUSTERS So, what can you do about this? If you have a hard disk over 10 megabytes originally configured under DOS 2.x., you can usually reconfigure it under DOS 3.x to get a smaller cluster size.

I'm going to tell you how, but you should read through this section and think about it for a while before you begin. It's a big job and it's scary. If you don't feel comfortable with it and you're not sure if you can adequately handle any problems, don't do it. OK?

I assume that your hard disk is connected to a hard disk controller and that has its own ROM BIOS, that you don't need anything special in a CONFIG STS list, and that you (or some-body at your computer store) originally configured the hard disk by running the normal FDISK and FORMAT commands included in IBMS PC-DOS 2.x.

You'll need a version of PC-DOS 3.0 or later for this. The most recent DOS version is 3.2.

First, you must back up your entire hard disk, using BACKUP. Do it rwice to play it safe. For your 12 megabytes of files, you'll need six or seven boxes of ten diskettes for the two backups. Buy high-quality diskettes for this. Format them all before you begin. Don't use any that have bad sectors.

The BACKUP command you want is BACKUP C:\\*.\* A: /S

This backs up everything on drive C:, including all subdirectories. BACKUP will

prompt you to put in new diskettes. Label them in sequence as you go, as you will have to RESTORE them later in the same order.

When you're done with the backup, boot up PC-DOS 3.2 from drive A: and then enter

FDTSK

Once in the FDISK program, you must first delete the existing DOS partition, which is one of the options on the menu. Then you must create a DOS partition, which is another option on the menu. You probably want to use the entire hard disk for DOS, so answer Yes to that question. Your system will now reboot. Make sure the DOS 3.2 diskette is still in drive A:

When you get back to the DOS prompt, you format the hard disk with

FORMAT C:/S/V

(The Vi is optional but allows you to give your hand disk volume label, otherwise known as a name.) After this is done, you can verify, that everything is running, smoothly by doing a DIR and a CHKDSR on drive C. Try reboomly with the drive A door open. Your machine should boot from the hard disk. A VER command should report DOS 3.2. At this point, you can creae a small file to see I your cluster site is indeed smaller. I should be 2048

Delete your small test file and boot up again from the DOS 3.2 floppy. Now you can proceed to RESTORE the backed-up files onto your hard disk. You should use the DOS 3.2 RESTORE command with the following syntax:

RESTORE A: C:\\*.\* /S /P
Is it that simple? Well, no.

THE PROBLEMS This whole process can be very scary, and you may encounter some "gotchas" along the way. Here are some of them:

First, some copy-protected programs installed on a hard disk may not work after a BACKUP and RESTORE. Others will. Some of the problem programs (1-2-3. Release 2, for instance) can be deinstalled. If you have any of these programs, deinstall them from the hard disk before you do your original backups and reinstall them when



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you're all done. When in doubt, contact the manufacturer. (After they give you the information you need, tell them what you think about copy protection. Use whatever command syntax you feel appropriate.) Second, people sometimes have problems with BACKUP and RESTORE. Sometimes RESTORE chokes in the middle of restoring from a bunch of diskettes. That's why you should do two BACKUPs.

You may want to take other precautions: Your hard disk probably has a number of purchased programs on it and a number of your own data files in various subdirectories. You can probably re-create those pacchased programs from the original diskettes. For your own data files, particularly the ones most valuable to you, use the regular COPY command to copy them to diskettes.

Third, BACKID will back up hidden Third, BACKID will back up hidden files called BibBIO COM and IBMDOS COM. When you run RESTORE, wount to use the P switch as shown above, which prompts you when it is about back-up over existing read-only files. When you get the prompt for IBMBIO COM and IBMOS.COM, answer No.

Fourth, RESTORE will still copy the old version of COMMAND COM from the backed-up floppies to your hard disk. Thus, when you are done with the RE-STORE operation, recopy COMMAND COM from the DOS 3.2 floppy diskette to the root directory of the hard disk, using the command

COPY COMMAND.COM C:\

If you boot from the newly formatted hard disk before running RESTORE. DOS will try to load the COMMAND. COM from the hard disk after RESTORE is completed. But this would be the old COMMAND .COM. This is why I recommend booting from the DOS 2.7 floppy before beginning RESTORE. When RESTORE ends, you will be prompted to put the DOS disk in drive A:, so it can find the correct version of COMMAND. COM.)

of COMMAND.COM.)
Fifth, diper you're done with the RE-STORE, your hard disk will have regained copies of all the old-version DOS external programs, such as CHKDSK and MODE. You must replace these with the new DOS 3 versions. DOS 3.2 has a command called REPLACE that automates this process.

Sixth, sometimes even after all this, funny things happen. For instance, you may have trouble booting from drive C:. If this is the case, boot from a DOS 3.2, floopy and get into FDISK again. Choose the "Change the Active Partition" option in the menu. If the status of the DOS partition is marked "N", it means it's nonactive,

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■ PC TUTOR

■ People who must have their disks recognizable by DOS 2.x shouldn't reconfigure their hard disks, but should put up with the large clusters.

which explains why you can't boot from it. Make it active. Indeed, sometimes just entering and leaving FDISK fixes the problem by itself.

If you think that your hard disk still has the old DOS IBMBIO, IBMDOS, or COMMAND files on it, you can boot from the DOS 3.2 floppy and execute the commands

SYS C:

and COPY COMMAND.COM C:\

This will reinstall DOS 3.2 on the hard disk

Seventh, if you have a tape backup unit and you would rather use that instead of BACKUP and RESTORE, you should determine whether it does a file-by-file backup or an "image" backup. Many tape backup units give you a choice. You want to do a file-by-file backup. If your tape backup unit can only do an image backup. don't use it. The image stored on the tape will include the hard disk's file allocation table, and this will be a different format under DOS 3.x. When you restore the hard disk from the imaged tape, the old file allocation table will be copied back to the disk. No good, If you do a file-by-file backup and restore, it will probably copy over the DOS files. Boot DOS 3.2 from drive A: and do the SYS command and COPY of COMMAND.COM before you try booting from the hard disk.

Eighth, after you've used DOS 3.x FDISK on a 20-megabyte or bigger disk, you cannot use the hard disk with any DOS version prior to 3.0. If you subsequently try to boot up from a DOS 2. x ftappy, DOS simply will not recognize the hard disk. Some people (program developers, mainly) need to test programs under several DOS versions. These people may need to have their hard disks recognizable by DOS 2. x. They should it reconfigure their hard disks, but should put up with the wastfully large 8192-byte cluster size instead.

Finally, this whole discussion is based on the IBM version of MS-DOS (which is called "Personal Computer DOS" by IBM and commonly called "PC-DOS" by the rest of us.) Some versions of MS-DOS for other manufacturers' machines may not support the smaller cluster site, so doing this will not have any effect. Again, when in doubt, contact the manufacturer.

I'm sorry if I have made this sound like a terrible job. I have reported everything I know that can possibly go wrong with this, including things I've experienced firsthand and things people have told me about.

As an alternative to using the BACK-UP/RESTORE procedure, you might wish to use John Dickinson's BAC.COM utility (Programming/Utilities, Volume 4 Number 17), which may be downloaded without charge from the PC Magazine Interactive Reader Service. It allows you to back up all the files in one (sub)directory at a time on the proper file-by-file (rather than image) basis, and it allows you to change diskettes as they become full. (This last reason is why you can't easily use the regular COPY command when backing up a whole hard disk.) The files backed up onto floppies with BAC.COM (unlike those made using BACKUP) are immediately editable, so after backing up your hard disk files (two BAC copies are still recommended for absolute safety) and before you FDISK and reformat your hard disk, you can delete the obsolete COMMAND.COM (and other old-version DOS external programs) from the backup floppies, saving some of the hassle when it comes time to put them back onto the newly formatted hard disk.-Ed.1

#### ASK THE PC TUTOR

The PC Tutor solves practical problems and explains points of general interest. To see your questions answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016.

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|                                               |                  |                                                           |        |                                                  |                   | Conv 600 Hr Res Monochrome)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 219 00           |                                                                          | 313.00           |
|                                               | 129 00           |                                                           |        |                                                  | 199.00            | Color F22 RGB for Ennanced                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                  | Nevellor                                                                 | 409.00           |
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|                                               |                  |                                                           |        | Color Combo CardiAT (129K)                       | 365 00            | NEC JOHN ROB! MULTISHNO!                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 579 DO           | Promotheus                                                               |                  |
| Emergraphics V2 0 (w/Plotter Opt.)            | 279 00           |                                                           | 42 00  | Misho Librii L. Cardilly / rt/1977               | SWIN              | Processon Greenics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                  | Promoten (200 External                                                   | 229.00           |
| Graham Sultware Corp.                         | 288 00           | Bullitane Marce                                           | 25-90  | Quadram<br>Quadram (720±480)                     | 538-00            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | ProModern 1200 External<br>ProModern 12000 as Software                   | 21900            |
| SG-Laser Plus<br>Ornel American Saffrage      |                  | SoftLogic Solutions                                       | 20.00  | Quadfox (Short floars)                           | 208-00            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | E.S. Pobelins Password 1200 Band                                         | 199.00           |
| Con-Array Para 1755                           | 149.00           | Disk Optimizer or Double Dos<br>Software Caround of Cools | 38-90  | Expending Quariboard (9004)                      | 98.00             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | Counter 2600 Rape                                                        |                  |
| A/S.AP or Provide Modules                     |                  | Enthalds Carquest of Cutof                                |        | Expanded Octariodato (0004)                      |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                          |                  |
| Meson Cornerrore VS 1                         |                  | Promise vide for Dar Marrie VTOS                          |        | Liberty-A7 EMS Board (W-128K)                    |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                          |                  |
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|                                               |                  |                                                           |        |                                                  |                   | RGB 620 Curier 640 x 200 res.<br>RGB 655 Curier 640 x 250 res.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 389 CO<br>459 CO | 1200 Plus External Modern                                                | 221 00<br>200 00 |
|                                               |                  |                                                           |        |                                                  |                   | RGB 655 Coter 645 x 350 res.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 459 DO           | 2400 Plus External Modern                                                |                  |
|                                               | 149.00           |                                                           |        |                                                  | 279-30            | AGB 750 EGA Monitor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 519 DO<br>559 DO |                                                                          |                  |
| VORSETTE VIO                                  |                  | Newsroom Pro                                              | 75 00  | Chauffeut HT                                     | 239-90            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | Ordering Instructions                                                    |                  |
| Writterfer Schniffe                           | 255 00           | Newsmooth City Art Corection                              | 10.00  | Super I O II                                     |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                          |                  |
| Thing Videolett Thing Tana V2 1 (55 Tex 35 T) | 105.00           | Vot 1 or Vot 3<br>Newsman Clip Art Collection Vol 3       | 24.00  | EGA Master / m 255% #GA+CGA                      | 258.00            | Blank Media                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                                                                          |                  |
| Labo Development                              |                  | Corridonia Maker                                          | 25.00  | Castain Multifunction (widers)                   |                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | Vise and Mestercard Accepted                                             |                  |
| Lenua 1-2-3 V2 01 /515" or 515"?              |                  | Quencia Estander                                          |        |                                                  |                   | BASEDS OD INVANCES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 12'00            | To proar cell us anytime Monday to                                       |                  |
|                                               |                  | Storing Software Intelligent Sockus                       |        |                                                  |                   | Back OS/SO (see of 18)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  | 8.00 to 9.00 Saturday 10:00 to 6:00                                      |                  |
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| Wiere Education (MECA)                        |                  |                                                           | 34 00  | (Mont Or Arapt Shrift Card)                      | 138.00            | Printers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                                                                          |                  |
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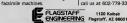
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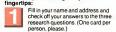
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Midwest Arthur Kossack— (312) 346-2600 180 N. Michigan Avenue Suite 1400 Chicago, IL 60601

WESTERN Southwest lennifer Bartel— (214) 691-6934 9956 Sherry Lane Suite 1330 Dailas, TX 75225

Northwest Heidi Spencer— (415) 598-2341 11 Davis Drive Belmont, CA 94002

Northern California GiniTalmadge— (415) 598-2344 11 Davis Drive Belmont, CA 94002

Southern Callfornia Debra Huisken— (213) 387-2100 3460 Wilshire Boulevard Los Angeles, CA 90010

# PC PRODUCT INDEX

| RSP                                                                              | ADVERTISER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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 | IDEAGogle AS Alexed IDEA Septembr/EMS, 8<br>IDEAgon<br>Mark Informatic Upperfor<br>Expanded Nemony Secul<br>Qual Stigmon<br>Core Stigmon<br>Supplies South Resed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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